LIVE-FIRE ARTILLERY TRAINING IN U.S. ARMY LIGHT DIVISIONS

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This study questions the appropriateness of live-fire artillery training as outlined in the current Field Artillery Mission Training Plans and Department of the Army Pamphlet 350-38, *Standards in Weapons Training,* in preparing direct support cannon battalions in America's Light Divisions to meet the fire support needs of the infantry brigades they support. In response, this thesis examines how these artillery battalions can address this challenge by determining which artillery fire missions they should execute during live-fire training.

Using collective observations and experiences from infantry operations at the Joint Readiness Training Center and the National Training Center, this study develops a base of infantry combat missions and determines fire support tasks, along with the contributing artillery fire missions, that are essential to their successful execution. This thesis compares these results with the fire missions provided in training doctrine.

This study concludes by offering a recommended list of specialized fire missions for direct support cannon battalions in U.S. Army Light Divisions to execute during live-fire training to best prepare them to help meet the fire support necessities of the infantry units they support.

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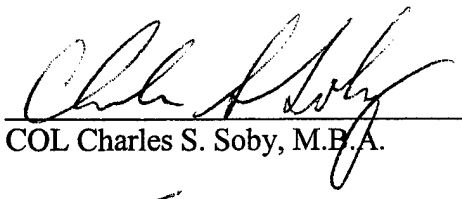

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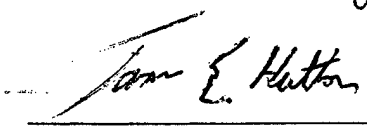

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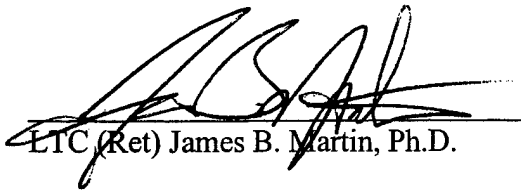

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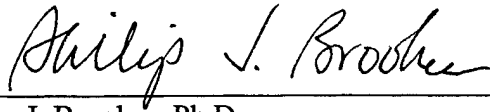

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ABSTRACT

LIVE-FIRE ARTILLERY TRAINING IN U.S. ARMY LIGHT DIVISIONS, by MAJ Barry S. Di Ruzza, USA, 100 pages.

This study questions the appropriateness of live-fire artillery training as outlined in the current Field Artillery Mission Training Plans and Department of the Army Pamphlet 350-38, *Standards in Weapons Training,* in preparing direct support cannon battalions in America's Light Divisions to meet the fire support needs of the infantry brigades they support. In response, this thesis examines how these artillery battalions can address this challenge by determining which artillery fire missions they should execute during live-fire training.

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ABBREVIATIONS

AMC	At My Command
ARTEP	Army Training and Evaluation Program
BCS	Battery Computer System
BOS	Battlefield Operating System
CALFEX	Combined Arms Live-Fire Exercises
CALL	Center for Army Lessons Learned
CFF	Call for Fire
CMTC	Combat Maneuver Training Center
CTC	Combat Training Centers
DA	Department of the Army
DART	Division Artillery Readiness Test
DS	Direct Support
EXEVAL	External Evaluation
FA	Field Artillery
FCX	Fire Coordination Exercises
FDC	Fire Direction Center
FFE	Fire for Effect
FIST	Fire Support Team
FM	Field Manual
FO	Forward Observer

FSO	Fire Support Officer
GPS	Global Positioning System
JRTC	Joint Readiness Training Center
MACOM	Major commands
METL	Mission Essentail Task List
mm	millimeter
MOUT	Military Operations in Urban Terrain
MTP	Mission Training Plan
NTC	National Training Center
OC	Observer-Controller
STRAC	*Standards in Weapons Training*
STX	Situational Training Exercises
THP	Take Home Packets
TOT	Time on Target
TTP	Tactics, Techniques, and Procedures

CHAPTER 1

INTRODUCTION

Background

The mission of the Field Artillery (FA) is to destroy, neutralize, or suppress the enemy by cannon, rocket, and missile fires and to help integrate all fire support assets into combined arms operations (Field Manual (FM) 6-50 1996, 1-1). Simply stated, artillerymen must develop skills in two major disciplines. The first is delivery, which is primarily devoted to the science of gunnery and the tactics of employing firing elements on the battlefield. The second is fire support, which is exclusively concerned with attacking the "right" target at the "right" time with the "right" asset at the "right" place. As Commanding General of the National Training Center (NTC) in 1992, Brigadier General William G. Carter stated that the "Field Artillery is exceptionally good at sending rounds downrange and hitting the right point in the ground. The piece we don't do well is to put rounds on a specific target at exactly the right time and event on the battlefield" (Carter 1992, 5).

Throughout the last twelve years as a fire support officer, firing battery commander, assistant operations officer, and observer-controller at the NTC, I have experienced first hand the numerous challenges and frustrations associated with the task of integrating fires at the brigade and task force levels. This period has also seen the Field Artillery, as well as other arms, evolve in how it plans, prepares, and executes its twofold mission through the incorporation of tactics, techniques, and procedures

developed as a result of experiences and lessons learned at the U.S. Army's Combat Training Centers (CTCs).

The Army has not witnessed, however, a corresponding evolution of the artillery's primary means to exercise and validate its ability to "destroy, neutralize, or suppress," which is, artillery live-fire training. Although some of the live-fire training events executed by direct support artillery battalions in the Army's light divisions are dedicated to improving the confidence and synchronization with maneuver, most are designed to practice and validate the artillery unit's gunnery skills and system. A brief review of live-fire training within the 25th Division Artillery and the 82nd Airborne Division Artillery reveals that this is the case. Direct support artillery battalions in both divisions execute live-fire events to train and validate their ability to provide synchronized artillery fires for the infantry brigades they support. Some of these events are combined arms live-fire exercises (CALFEX), fire coordination exercises (FCX), and close fires situational training exercises (STX) executed in the spirit of integrating artillery live-fire with the infantry units they support. Others are external evaluations (EXEVAL), division artillery readiness tests (DART) and battalion artillery readiness tests (BART) designed to primarily practice and validate the gunnery team's ability to meet the five requirements for accurate and predicted fires (82d Airborne Division Artillery and 25th Infantry Division Artillery Data). An examination of the U.S. Army's training doctrine can explain why artillery live-fire training has yet to fully evolve.

U.S. Army training doctrine as described in FM 25-101, *Battle Focused Training,* requires a battalion commander to analyze higher and supported units' wartime missions,

mission essential task lists (METLs), and war plans to identify his unit's specified and implied tasks. FM 25-101 then directs him to determine his collective tasks using an operation-to-collective task matrix, from the appropriate mission training plan (MTP) for his type of battalion, as a primary reference. The MTP is the cornerstone, "descriptive training document which provides units a clear description of "what" and "how" to train to achieve wartime mission proficiency " (FM 25-101 1990, glossary-5).

Current artillery MTPs describe an optimal training strategy as consisting of three components: combined arms, gunnery, and soldier (Army Training and Evaluation Program (ARTEP) 6-037-30-MTP 1998, 1-3-1-4). Guidelines for the gunnery component of a training strategy come from the Department of the Army Pamphlet (DA Pam) 350-38, *Standards in Weapons Training (STRAC)*. This publication provides a standard gunnery training program with qualification standards for each weapon system, suggests training strategies to achieve proficiency, and associates training ammunition requirements to meet stated qualification objectives. *STRAC* mandates that active component field artillery cannon batteries and battalions must "live-fire 80 percent of their METL-related fire missions to ARTEP MTP standards twice annually" (DA Pam 350-38 1997, 30). It also specifies the fire mission types, as identified in the MTP, which all direct support (DS) batteries and battalions in light divisions (105 millimeter) must execute. This list of fire missions does not replicate well the type and number of fire missions that direct support artillery battalions are required to execute in support of maneuver brigade and battalion combat operations.

The primary references that outline the tasks, conditions, and standards for artillery live-fire missions are the ARTEP 6- Series, Mission Training Plans. Each MTP is specific to the weapon system and type of artillery organization to which it applies and contains a list of fire missions (tasks and conditions) and the time limits and accuracy requirements that each component of the gunnery team is required to execute (standards). From my experience and research, however, direct support field artillery battalions do not execute the type of missions that the MTPs describe, under the conditions the MTPs provide, or within the standards the MTPs outline when executing fires in support of a maneuver brigade.

It appears that a doctrinal dichotomy exists between how artillery battalions train to integrate, synchronize, and employ artillery fires in support of a maneuver brigade and how they train the components of the gunnery team to deliver accurate, predicted artillery fires. This disparity suggests that artillerymen are violating the second of the nine principles of training, "train as you fight," as outlined in FM 25-100, *Training the Force*. In answering the research question, this study will examine how direct support artillery battalions in the U.S. Army's light divisions can address this challenge by determining which artillery fire missions they should execute during their live-fire training.

The Research Question

The primary question that this thesis will answer is: What fire missions should DS artillery battalions in U.S. Army light divisions execute during live-fire training to provide responsive, effective, and appropriate artillery fires needed by their supported

infantry brigades in combat? By answering the following subordinate questions, this thesis will be able to adequately address its primary purpose:

1. What combat missions do light infantry brigades perform?

2. What fire support tasks are essential to supporting the combat missions of light infantry brigades?

3. What artillery fire missions are provided in and required by U.S. Army field artillery and training doctrine?

4. What artillery fire missions are fundamental to accomplishing the essential fire support tasks?

Assumptions

In order to proceed, this thesis must make the following assumptions:

1. Force on force engagements fought at the Army's CTCs closely represent actual combat, and lessons learned from these experiences are applicable to future combat operations.

2. By examining two years of the CTC's experiences and training data from U.S. Army light divisions, one can sufficiently represent the fire support needs and training procedures of the Army's light forces.

3. Experiences and observations regarding fire support and artillery training over the past twelve years are valid, and the problem explained remains, for the most part, unsolved.

4. Part of the continuous challenge the Army faces with integrating fires in support of maneuver rests with the way the doctrine directs DS FA battalions to conduct live-fire training.

Definitions

At My Command (AMC): A method of control that a forward observer or fire direction center uses when they want to control the time of delivery of fire. This method has all participating firing elements firing at the target area at the same time. This method can reduce the sporadic engagement of the target normally associated with " when ready" missions (FM 6-30 1991, chap.4).

Adjust Fire: A type of indirect fire mission where the observer believes that an adjustment must be made because of questionable target location or lack of the firing unit's ability to meet the five requirements for accurate and predicted fire (FM 6-30, chap.4).

Battery Computer System (BCS) Sheaf: A pattern of projectile bursts in the target area that the BCS automatically determines when computing individual weapon aiming points for best coverage of a target (FM 6-30 1991, chap.4).

Call for Fire (CFF): A concise message prepared by the forward observer. It contains all information needed by the fire direction center (FDC) to determine the method of target attack. It is a request for fire, not an order (FM 6-30 1991, chap.4).

Circular Target: A target that is circular in nature or its exact shape is vague (FM 6-20-50 1990, app. F).

Converged Sheaf: A pattern of projectile bursts in the target area that places all rounds on a specific point and that is used for small, hard targets (FM 6-30 1991, chap.4).

Danger Close: A term included in a call for fire indicating that friendly forces are within 600 meters of the target (FM 101-5-1 1997, 1-44).

Direct Support (DS): This is one of the four standard tactical missions that commanders assign to field artillery (FA) units. An FA battalion with a DS mission to a maneuver brigade is concerned primarily with the fire support needs of only that brigade. The DS FA battalion commander is responsible for planning his unit's fires and positioning his unit to best support the brigade's scheme of maneuver. DS FA battalions typically establish a habitual relationship with the brigades that they support (FM 6-20-2 1993, 1-2).

Fire-for-effect (FFE): A type of indirect fire mission where the observer is certain that the target location is accurate and that the first volley should have the desired effect on the target so that little or no adjustment is required. Units should strive to be able to shoot first-round FFE missions by meeting the five requirements for accurate and predicted fire (FM 6-30 1991, chap.4).

Fire Support: The collective and coordinated integration and synchronization of the fires and effects of armed aircraft, land-based and sea-based indirect fire systems, and electronic warfare systems that directly support combat forces against ground targets to delay, disrupt, destroy, divert, damage, and limit enemy forces, combat formations, and facilities in pursuit of operational and tactical objectives (FM 101-5-1 1997, 1-66).

Five Requirements for Accurate Predicted Fire: If artillery units accurately measure and compensate for nonstandard conditions by accounting for the five requirements of target location, firing unit location, weapon and ammunition information, meteorological information, and computational procedures, they can achieve first-round fire-for-effect on a target (FM 6-40 1996, 1-3, 1-4).

Group of Targets: A group of targets consists of two or more targets upon which the maneuver commander desires a simultaneous attack. The number of FA firing batteries and battalions available must be considered in planning groups of targets. Inclusion of individual targets in a group does not preclude them from being attacked individually (FM 6-20-50 1990, app. F).

Gunnery: The science that involves computing and applying weapon and ammunition settings to artillery weapons and ammunition that cause projectiles to achieve the desired effects on the target (FM 6-40 1996, 1-1).

Gunnery Team: Since artillery is primarily an indirect fire weapon, a single battlefield element cannot effectively employ these fires. This requires a coordinated effort by the gunnery team, whose primary components for this study are the forward observer (FO)/fire support team (FIST), the fire direction center (FDC), and the firing battery of a M119 equipped artillery battalion in a U.S. Army light division. The observer calls for fire on the target(s) that requires attack. The FDC receives the FO's call for fire and determines fire orders and fire commands, and the firing battery tactically employs and operates the howitzers that shoot the artillery ammunition (FM 6-40 1996, 1-1thru 1-3).

Immediate Suppression and Immediate Smoke: Two types of indirect fire missions designed to engage a planned target or target of opportunity, with high explosive or white phosphorous and smoke projectiles respectively, that has taken friendly maneuver or aerial elements under fire (FM 6-30 1991, chap.4).

Large Irregular Shaped Target: The term artillery units give to targets that do not conform to the parameters of a point, circular, linear, or rectangular target. This target may require multiple firing unit aim points in order to affect the entire target area.

Linear Target: A target more than 200 meters, but less than 600 meters long. Targets longer than 600 meters require fire support assets other than field artillery or must be further subdivided into multiple targets for attack by field artillery (FM 6-20-50 1990, app. F).

Live-Fire Training: For the purpose of this study, live-fire training is defined as a collective training event, or series of events, that incorporates the gunnery team and focuses on practicing or validating the artillery unit's ability to deliver accurate and timely fires through shooting live artillery ammunition.

Mark: A method of engagement used by a forward observer to indicate that he is going to call for rounds to either orient himself in his zone of observation or to indicate targets to ground troops, aircraft, or fire support (FM 6-30 1991, chap.4).

On-Call Target: A planned target that has not been scheduled for attack at a specific time but which may be attacked when requested. The on-call target requires less reaction time than a target of opportunity (FM 6-20-50 1990, app. F).

Open Sheaf: A pattern of projectile bursts over the target area that separates the bursts by the maximum effective burst width of the shell fired (FM 6-30 1991, chap.4).

Planned Target: A target upon which fires are prearranged. Some prior coordination or action has been done to facilitate its engagement. Planned targets may be further subdivided into scheduled, on-call, and priority targets (FM 6-20-50 1990, appendix F).

Point Target: A target that is less than 200 meters wide (FM 6-20-50 1990, appendix F).

Preparation Fire: Fire delivered on targets preparatory to an assault. A direct support FA battalion or higher echelon plans the preparation. It is an intense volume of fire delivered in accordance with a time schedule. Duration of the preparation is influenced by factors such as the fire support needs of the entire force, the number of targets, and the firing assets and ammunition available (FM 6-20-50 1990, app. F).

Priority Target: A target which, when requested for attack, takes priority over all other requests. When not engaged in fire missions, firing units lay on priority targets. Six-gun batteries can attack as many as three priority targets. Two priority targets may be assigned to an 81-millimeter (mm) mortar platoon--one per section (FM 6-20-50 1990, app. F).

Rectangular Target: A target that is wider and longer than 200 meters (FM 6-20-50 1990, Appendix F).

Scheduled Target: A planned target that will be attacked at a specific time. This time may be related to an H-hour or to another time reference (FM 6-20-50 1990, app. F).

Series of Targets: A series of targets is a number of targets or groups of targets planned to be fired in a predetermined time sequence to support a maneuver operation. A series may also be fired on call, at a specified time, or when a certain event occurs (FM 6-20-50 1990, app. F).

Suppression Mission: A type of indirect fire mission designed to quickly bring fire on a target that is not currently active. Suppression missions are normally fired on preplanned targets and a duration is associated with the call for fire (FM 6-30 1991, chap.4).

Sweep and Zone Mission: A method for attacking a large or irregular shaped target. The sweep fires cause the guns in a firing battery to place a number of sheafs side by side over the target. Zone fires cause the guns to fire a number of sheafs stacked over the target. To apply a direct fire analogy, sweep fires are like traversing fires on an objective, and zone fires are like searching fires on an objective (FM 6-40 1996, H-10, 11).

Target: The most fundamental term used in fire support planning. A target is personnel, materiel, or a piece of terrain that is designated and numbered for future reference or attack (FM 6-20-50 1990, app. F).

Target of Opportunity: A target that appears during combat and against which no attack has been prearranged (FM 6-20-50 1990, app. F).

Final Protective Fires: Final protective fires are a special set of priority targets. They are designed to create a final *barrier of steel* that keeps the enemy from moving

across defensive lines. Final protective fires are desperation fires (FM 6-20-50 1990, appendix F).

Time on Target (TOT): Another method of control that a forward observer or fire direction center uses to control the time of delivery of fire. Like the AMC method of control, the TOT is useful in massing fires. This differs from an AMC mission in that individual firing units determine when they must fire, based on their time of flight, to have initial rounds impact in the target area at the same time (FM 6-40 1996, 5-12).

When Ready: The standard method of control used to determine the time of delivery of fire. Under this technique, each battery will fire when ready. This technique is used more often with adjust-fire missions than with fire-for-effect missions (FM 6-40 1996, 5-12).

Limitations

The most significant limitation of this proposed study is that it will base much of its validity on satisfying the fire support needs of light infantry battalion and brigade commanders. The primary means by which this thesis will determine these needs is through examining relatively recent engagements/rotations by light infantry units at the Army's CTCs. Since all artillery fires at the CTCs in support of force on force battles are simulated, there will be limitations on the application of the thesis conclusions to our doctrine, just as there are limits to how well simulations replicate the impact of artillery on the CTC battlefield.

Delimitations

Although the problem addressed in this thesis applies to direct support artillery units throughout the Army, The scope is narrowed to light divisions due to limited time and relevance to future assignments. The research is restricted to engagements fought by elements of light divisions at both the NTC and Joint Readiness Training Center (JRTC) from 1995 unit the present. This allows the best use of research time, but gathers data that is current and from two unique training/warfighting environments. Despite the probability that the infantry may have to conduct military operations in urban terrain (MOUT), this thesis will not consider MOUT due to the limited time available and the difficulties associated with employing artillery fires in that environment. In addition, this study will limit the focus of artillery live-fire training to the fire direction center and firing battery components of the gunnery team. Finally, this thesis acknowledges that artillery units will always need to possess the necessary skills to meet the five requirements for accurate and predicted fire and will not consider the specific fire missions designed to account for all nonstandard conditions. These delimitations are necessary to achieve an appropriate study given the available time.

Significance of the Study

This thesis will be one of the few studies that address how DS artillery battalions should conduct live-fire training to provide responsive and effective fires in combat to the brigades they support. When completed, this study will challenge the Army's existing training doctrine, and offer practical recommendations focused on improving artillery

live-fire training and, ultimately, the synchronization of indirect fires at the brigade level and below.

CHAPTER 2

LITERATURE REVIEW

Introduction

Although volumes of information on fire support and field artillery doctrine, tactics, techniques, and procedures exist, there is little or no information related to answering the primary thesis research question. There are, however, substantial categories of written materiel that address specific areas concerning fire support and field artillery, which individually and in combination, adequately answer the subordinate thesis research questions. This chapter will review the available literature pertinent to this study by organizing it into three sections. The first section pertains to literature necessary to answer research questions 1, 2, and 4. The second section provides publications required to address research question 3, and the third section discusses data required for background information.

Section One

The following categories of publications provide relevant information necessary to determine infantry brigade combat missions, the fire support tasks essential to supporting them, and the types of artillery fire missions required to accomplish the tasks.

U.S. Army 6-xx and 7-xx series Field Manuals

As U.S. Army doctrine, tactics, techniques, and procedures, these references provided a starting point for the thesis research. These FMs establish guidelines and provide techniques for how brigade combined arms leaders are expected to integrate

artillery fires in support of combat operations. Those particularly applicable to this study are as follows:

FM 6-20-50, *Fire Support for Brigade Operations (Light),* provides tactics, techniques, and procedures for employing all types of available indirect fires in support of light infantry operations at the brigade level and below. Its primary usefulness to this study is that it is one of the few manuals that outlines fire support considerations and suggests fires tasks for each type of offensive, defensive, and retrograde operation. Although the fires tasks listed in this manual span the entire indirect fire spectrum and do not address specific artillery fire mission types, there are adequate references to provide maneuver commanders and fire support officers (FSOs) with an understanding of how to support light infantry forces with artillery fires. Additionally, this manual has an appendix dedicated to explaining target terms, symbols, schedules, and tools. This section explains target terms (scheduled, on-call, priority target, and final protective fires), target symbols (point, linear, rectangular, and circular), types of planned fires (group, series, program, preparation, and counterpreparation) and scheduling techniques in detail. This is important since these are the means by which the fire support plan is communicated to the field artillery battalion and transformed into artillery fire missions.

FM 6-71, *Fire Support for the Combined Arms Commander,* assists the maneuver brigade or battalion commander with synchronizing and applying indirect fires in support of combined arms operations. It succinctly and effectively outlines the capabilities and characteristics of the typical fire support assets available to the maneuver battalion or brigade. It also discusses the duties and responsibilities of fire support personnel, key

staff members, and subordinate commanders in deriving and executing the fire support plan. Chapter 4 is dedicated to illustrating how to employ fire support for the various offensive, defensive, and retrograde operations. Additionally, this chapter discusses how the commander should articulate his guidance for fires by providing engagement criteria (number of vehicles or size of formation), target effects (destroy, neutralize, suppress), and attack criteria (enemy target types). Unfortunately, however, most of the employment tips are directed towards considering observer positioning, artillery movement, and fire planning for certain portions or phases of an operation. What the field manual does not recommend are fires tasks for field artillery or other systems to complement and support each of the various tactical operations.

FM 7-20, *The Infantry Battalion,* and FM 7-30, *The Infantry Brigade*, provide doctrine for the light, air assault, airborne, and ranger infantry battalion and brigade in combat. Although these manuals very thoroughly cover how to plan and execute infantry combat operations, they lack essential details in discussing how to fight the combined arms team. Unlike FM 6-20-50, these manuals only provide general command and control issues, positioning considerations, and limited suggestions on how to integrate field artillery fires into each type of offensive, defensive, or retrograde operation. Each has a section dedicated to explaining the key characteristics of the fire support battlefield operating system (BOS) including its organization, capabilities, and key leader duties. In these sections there are paragraphs that outline general employment considerations for indirect fires, including artillery, for the attack, final protective fires, and the counterattack. Surprisingly, these field manuals did not adequately address, in terms of

possible fire support tasks, how an infantry battalion or brigade should use field artillery fires to assist in executing tactical operations.

Center for Army Lessons Learned

Products available through the Center for Army Lessons Learned (CALL) cover a wide range of ideas and areas. Of particular interest are CALL newsletters, Combat Training Center (CTC) quarterly bulletins and trends, and unit take home packets (THPs) from rotations at the NTC and JRTC.

CALL newsletters and CTC quarterly bulletins and trends provide an excellent source for observations on how US Army brigades, including those assigned to light divisions, plan, prepare, and execute simulated combat operations at the Army's CTCs. CALL compiles observations from NTC, JRTC, and the Combat Maneuver Training Center (CMTC) then publishes annual and quarterly trends and informative articles that address all the BOS. These publications provide necessary information that helps supplement what is contained in the 6-xx series and 7-xx series field manuals. Although these materials, by themselves, do not specifically answer the subordinate research questions, they do provide a necessary perspective on determining the types of artillery missions brigades require to successfully support combat operations. By studying the nature and frequency of fire support trends listed in the CALL publications, one can determine the fires tasks that brigades have attempted to execute and interpolate from them the artillery missions brigades will need to execute in combat.

Unit THPs are fairly extensive summaries of every brigade's performance during its rotation at one of the Army's CTCs. The THPs prepared by the NTC and JRTC

address both positive and negative performance trends in each BOS. Helpful items within each THP that pertain to the fire support BOS are the fire support annexes produced by the unit staffs, the fire mission log listing executed missions, and after action review (AAR) comments for each battle fought by that brigade during its rotation. By combining the information from each of these areas, one can get a good appreciation for the fires tasks and purposes the brigade intended to accomplish, the number, type, and result of artillery missions the field artillery fired, and the level of success the unit achieved in accomplishing their stated fire support tasks. Unit THPs also provide excellent summaries of all missions performed by the rotational unit.

Articles from Professional Journals

Professional journals, especially *Field Artillery* and *Infantry*, contain articles on artillery training, fire support integration, and CTC experiences, among others, from a wide variety of professionals who often provide insight and innovative thoughts on these subjects. Those that provided perspective to the thesis topic and that gave additional insight are highlighted below.

Field Artillery. The Lightfighter Series is written by Captain David D. Hollands and includes three articles on artillery tactics, techniques, and procedures for the danger-close fight published from February through June 1993. In these articles, Captain Hollands describes specific ways that light infantry units can integrate artillery fires in support of a movement to contact and an attack and how they can minimize or prevent fratricide. In his article "Fire Support Observations" published in March-April 1996, Lieutenant Colonel Theodore Janosko discusses several challenges that infantry units

encounter while training at the JRTC. Among his observations are that units are reluctant and often unable to consistently and effectively employ artillery and mortar fires during small unit engagements in heavily wooded terrain. He addresses this recurring issue by suggesting some training techniques and potential solutions. Lieutenant Colonel David L. Anderson echoes this observation in "Fast, Accurate Fires in the Close Fight," an article in the same issue of *Field Artillery*, claiming that infantry leaders and their fire supporters are untrained at executing danger-close indirect fires after making first contact with the enemy. He proposes some execution battle drills that he has seen work well at the JRTC as a way to overcome this challenge. Lieutenant Colonel Joseph F. Napoli followed in the May-June 1997 issue with "The FO and His PLGR in the Close Fight" where he outlines how forward observers can use their issued Global Positioning System (GPS) receivers to better integrate indirect fires in the close fight. Finally, Lieutenant Colonel Theodore S. Russel Jr. provides a detailed method to help infantry commanders and fire supporters synchronize indirect fires for an air assault and attack in "Echeloning Fires" published in March-April 1997. Included in his suggested process are fire mission responsibilities for the direct support artillery.

Infantry. Although there are several articles throughout the recent history of this periodical concerning fire support, the most relevant to this study is "Effective Fire Support at the JRTC" written by Lieutenant Colonel Bruce A. Brant. As the senior fire support observer-controller (OC) at the JRTC, Lieutenant Colonel Brant provides an overview of the challenges that infantry units face when attempting to integrate indirect

fires with maneuver and gives a thorough recommendation on how units can successfully execute fires.

Observer-Controllers

In general, the fire support observer-controllers at the Army's CTCs are an excellent primary source of information concerning overall fire support trends throughout the Army, as well as performance observations that are specific to the light infantry battalions and brigades on which this study has chosen to focus. By combining the experiences of observer-controllers at both the NTC and JRTC, this study can incorporate viewpoints from a purely light force with one that reflects a mix of heavy and light forces. Additionally, by considering rotational performance at both training centers, this study can acquire data pertinent to a variety of environmental, combat, and terrain conditions.

NTC. Major Robert Morschauser served as the Light Task Force Fire Support Combat Trainer at the NTC for over fifteen months. During his tenure, he observed seven light infantry battalions plan, prepare, and execute fire support plans in support of simulated combat operations in a desert environment. His knowledge provides this study with relevant data on the type of artillery fire missions light infantry battalions required and attempted to employ in support of their given missions. Additionally, his observations offer a perspective as to the success and appropriateness of their efforts.

JRTC. Major David Bushey and Major James Inman served as fire support observer-controllers at the JRTC from 1994 until 1998. Collectively, they have seven years of experience observing how America's light infantry battalions and brigades

planned, prepared, and conducted simulated combat operations in the densely wooded terrain surrounding Fort Polk, Louisiana. Their experiences, like those of Major Morschauser, provide this study with very contemporary and highly relevant data that clearly demonstrate how light infantry units have attempted to use field artillery fires in the past and how they are likely to employ artillery fires in support of any future combat operations.

Section Two

The following categories of publications provide relevant information necessary to determine the types of artillery fire missions that are provided for and outlined in U.S. Army fire support and training doctrine.

Mission Training Plans

MTPs provide Army units with the "how-to" information to conduct training to meet their wartime missions. They provide a description of how units should develop a training and evaluation program that achieves wartime proficiency. The "6-series," or artillery and fire support MTPs state the collective tasks that artillery organizations must execute, conditions under which units should perform, and standards to which units should train to achieve. The artillery MTPs also list the live-fire missions with time and accuracy standards that the gunnery team should be able to execute.

ARTEP 6-115-MTP, *Mission Training Plan for Field Artillery Cannon Battalion Headquarters and Headquarters Battery; Headquarters, Headquarters and Service Battery; or Service Battery*, is the applicable MTP for all field artillery cannon battalion headquarters and staffs regardless of their assigned tactical mission or type of maneuver

unit they support. This document describes four collective tasks that directly pertain to executing artillery fire missions: (1) register battalion howitzers and munitions, (2) process and fire battalion adjust fire missions, (3) process and fire battalion fire-for-effect missions, and (4) process and fire a schedule of fires. For each of these collective tasks, the MTP lists the task steps and standards of performance. These task steps differentiate the several different types of artillery missions a battalion must perform by identifying and modifying the standards of performance based on the type of observer or observation device, method of control, type of munition, and angle of attack. In addition, this MTP outlines in detail the standards and processes for evaluating the accuracy of artillery fires. Of interesting note, this MTP implies that all field artillery cannon battalions share the same collective tasks and task steps.

ARTEP 6-037-30-MTP, *Mission Training Plan for the Field Artillery Cannon (Consolidated) Firing Battery,* is the applicable training and evaluation document for all field artillery cannon batteries. This MTP lists four collective tasks that directly concern shooting artillery fire missions: (1) conduct fire missions, (2) conduct an air assault artillery raid, (3) conduct a field artillery raid, and (4) conduct an emergency mission. Conduct fire missions is the only collective task that lists task steps associated with the howitzer section chief and cannoneers in firing the howitzer, and these steps remain the same regardless of fire mission type. The remaining three collective tasks outline the necessary leader tasks that are peculiar to either the battery's disposition at the time they receive the call for fire (CFF) or the battery's method of occupying a firing position. Additionally, this document publishes the battery level time standards appropriate for

each type of fire mission based on how the battery receives the CFF (voice by radio or digital by radio) and how it computes the technical solution (manually or with a computer).

Army Regulations, Department of the Army Pamphlets, and Field Manuals on Training

FM 25-100, *Training the Force,* outlines the US Army's standardized training doctrine and FM 25-101, *Battle Focused Training,* applies this doctrine at the battalion level and below. Together they provide guidelines and techniques on how leaders should plan, execute, and evaluate unit training. Important to this study is how these documents demonstrate and describe the process of developing a unit METL and integrating the collective tasks found in the MTPs to produce a training strategy and plan to achieve wartime proficiency. (These manuals imply that the best and only way to develop an effective training plan is to base the training tasks on those in the MTP.)

DA Pam 350-38, *Standards in Weapons Training (STRAC)*, outlines the terms concerning weapons training programs in the Army. It provides a standard gunnery training program with qualification standards for each weapon system, suggests training strategies to achieve proficiency, and associates training ammunition requirements to meet stated qualification objectives. *STRAC* mandates that active component field artillery cannon batteries and battalions must "live-fire 80 percent of their METL related fire missions to ARTEP MTP standards twice annually" (DA Pam 350-38 1997, 30). It also specifies the fire mission types, as identified in the MTP that all DS batteries and battalions in light divisions (105 mm) must execute.

Section Three

The following are other categories of data that provide relevant background information necessary to produce a complete study.

Unit Training Documents

Prior to beginning this study, it was necessary to gain an appreciation for how DS FA battalions in U.S. Army light divisions actually execute live-fire exercises and live-fire missions in their annual training. Annual and quarterly training guidance memorandums, operations orders, and standard operating procedures were instrumental in providing current information on how direct support artillery battalions in the Army's light divisions are actually conducting their live-fire training. This data was key to supporting the thesis assumptions and providing this thesis with a valid purpose. It was impractical to think that this study would be able to consider data from each of the twelve DS FA battalions associated with the Army's four light divisions. Instead, this thesis established a small, manageable, yet highly representative sample population of two DS FA battalions. By limiting the data to consider to two battalions, this thesis was able to make reasonable assumptions regarding how DS FA battalions in light divisions conduct their live-fire training. By selecting one unit from the 82d Airborne Division Artillery and another from the 25th Infantry Division (Light) Artillery, this investigation gained a training perspective from two separate major commands (MACOMs) operating in two different training environments. Additionally, by considering and addressing the training regulations, standardization letters, and annual requirements from the division artillery and division headquarters of both battalions, this research effort assumed that each of the

selected battalions operates similarly to its sister DS FA battalion within the same division and that examining one battalion per division artillery is representative of the others assigned. In this way, the study's starting assumption was representative of 50 percent of the DS FA battalions in the active Army.

Other

Monographs and Theses. In addition to adding perspective to the research, these documents provided good examples of thesis organization and research methodologies, and a consolidated list of associated published material.

Conclusion

The review of literature regarding this study concluded that there has been no scholarly effort to date to address the primary thesis research question. There are, however, several publications and sources that sufficiently address the secondary and supporting thesis research questions. It is necessary to piece together all the listed sources to capitalize on their strengths to sufficiently and eventually answer the primary research question.

CHAPTER 3

RESEARCH METHODOLOGY

Introduction

This thesis will explore how DS artillery battalions in U.S. Army light divisions can use live-fire training to prepare themselves to execute the required artillery fires in support of an infantry brigade in combat. It will use a deductive process by gathering and analyzing the results of the relevant research in the field. This study will follow four phases, each devoted to answering the secondary research questions. Chapter 4 will begin by studying and analyzing available data to determine the combat missions that infantry brigades perform (research question 1), and the essential fire support tasks associated with those missions (research question 2). It will then examine the types of artillery tasks and fire missions demanded by, and provided for in the U.S. Army's artillery, fire support, and training doctrine (research question 3) and briefly discuss their appropriateness. Chapter 4 will conclude by determining the types of artillery fire missions necessary to accomplish the fire support tasks (research question 4). By providing a list of appropriate artillery live-fire missions that better prepare a direct support artillery battalion to meet an infantry brigade's fire support requirements in combat, this effort intends to answer the primary thesis research question.

Research Question 1

The initial research effort of this thesis is to outline the types of combat missions that infantry brigades and battalions perform. According to the review of literature, FM 7-20, *The Infantry Battalion,* and FM 7-30, *The Infantry Brigade,* will adequately provide

this research effort with the doctrinal mission requirements for light infantry battalions and brigades. This study will attempt to limit the number and type of doctrinal infantry combat missions to consider by looking at which missions infantry units most often execute from archive data from the NTC and JRTC. An assumption this study makes at this stage is that the missions which light division and brigade commanders choose to execute at the CTCs are representative of the missions their units would most likely be called on to perform in combat. By looking at unit rotations from both the JRTC and the NTC and capturing the most common infantry combat missions, this examination can assure that it gathers applicable data concerning infantry operations from both "light-heavy" and "heavy-light" task organizations and in both restrictive and open terrain. This thesis intends to validate its selected subset of doctrinal infantry missions, in essence its starting point, by comparing the set of selections to representative unit METLs. What should result is an infantry mission base for which all subsequent data can be screened, tailored, and limited.

Research Question 2

The next step is to determine the fire support tasks that are required to support the infantry mission base. This study will look heavily at the existing fire support doctrine provided in FM 6-20-50, *Fire Support for Brigade Operations (Light),* to discover the tasks required from available fire support systems to support each of the missions in the infantry mission base. The study will then explore FM 7-20, *The Infantry battalion*, and FM 7-30, *The Infantry Brigade,* to see what fire support tasks and roles infantry doctrine calls for when executing each of these missions. This research effort intends to

supplement doctrine by examining current trends from the CTCs as well as published trends and suggested techniques from subject matter experts in order to bridge any gaps that may exist between what doctrine requires and what realistic experiences demand. This study will look towards CTC archive data, CALL newsletters and CTC quarterly bulletins and trends, articles in professional journals, and interviews with Army officers who have served as fire support OCs to gain the perspective of current subject matter experts in the fire support field.

The endstate of this stage of the research process is to compile a list of fire support tasks that are necessary for a DS FA battalion to execute to support the infantry mission base. For those fire support tasks, missions, or functions that lack doctrinal names, this thesis will apply and define terms for purposes of brevity and commonality of thought. One criterion this work will apply to create this list will be currency. By reviewing the most current doctrinal manuals and by considering CTC data, professional articles, and interview results concerning events from 1996 to the present, the research effort should deliver the most current list of relevant fire support tasks appropriate to supporting the infantry mission base that can reasonably be expected. An additional criterion that this study will use to select fire support tasks is frequency. The more often doctrine, TTPs, subject matter experts, and CTC archive data mention a particular fire support task or function in relation to one of the missions in the infantry mission base, the more validity this thesis will give it. By their nature, CTC trends are developed from their frequency of occurrence, and by reviewing them, this research process will automatically identify some fire support tasks that meet the second criterion. In its

review of doctrine, the research effort will place a higher priority to those fire support tasks or functions that apply to multiple missions in the infantry mission base. In this way, this thesis hopes to develop a current, relevant, manageable list of priority fire support tasks to proceed to the next research phase.

Research Question 3

Next, the research process must determine which artillery fire missions are provided for in the U.S. Army's training doctrine. This study will explore the MTPs that specifically apply to a DS FA battalion in a light division. These manuals stipulate all fire mission tasks, conditions, and standards that the artillery unit can and should execute through live-fire training events. Additionally, this portion of the research process will examine DA Pam 350-38, *Standards in Weapons Training (STRAC),* to highlight the qualification mandates that active component field artillery cannon batteries and battalions must successfully meet through engaging in live-fire training events. To be of any significant value, this data must be both relevant and current. By reviewing the most current versions of DA Pam 350-38 and by selecting the most applicable MTPs, this thesis intends to provide valid results that meet the criteria. The result of this effort should be a compilation of all the fire mission types that a DS FA battalion in a light division is required to execute by the U.S. Army's training doctrine.

Research Question 4

The step that follows is the identification of fire support tasks from the list of essential fire support tasks that can and should be performed with direct support cannon artillery. By briefly reviewing the capabilities and limitations of cannon artillery in

general and of the howitzers found in a DS FA battalion of a light division in particular, this research effort can draw supportable conclusions regarding the type of fire missions that DS cannon artillery *can* provide. Furthermore, by taking those tasks and identifying the ones that can only be accomplished through cannon artillery, this study can derive a subset of fire support tasks that DS cannon artillery *must* provide. Chapter 4 will conclude by providing a list of appropriate artillery live-fire missions that better prepare a direct support artillery battalion to meet an infantry brigade's fire support requirements in combat.

Conclusions and Recommendations

Chapter 5 will provide conclusions and recommendations resulting from this study. This final stage of the research process will reveal how the average DS FA battalion in America's light divisions can incorporate the suggested list of live-fire missions that support the essential fire support tasks into a training strategy. This phase will conclude with recommendations for further research and study on this and related subjects.

CHAPTER 4

ANALYSIS

Research Question 1: Infantry Missions

To effectively determine what fire missions DS FA battalions in light divisions should execute during live-fire training in order to meet the mission requirements of the infantry brigades and battalions that they support, this chapter must first examine and determine what operations, missions, and tasks the Army's doctrine requires light infantry brigades and battalions to be able to perform. FM 101-5-1, *Operational Terms and Graphics,* describes the term **operation,** in part, as " the carrying out of a . . . tactical military mission" (FM 101-5-1 1997, 1-114). The manual defines **mission** as the "task, together with the purpose, that clearly indicates the action to be taken and the reason therefore" (FM 101-5 1997, 1-107). It also defines a **tactical task** as "a specific activity to be performed by the unit while conducting a form of tactical operation or a choice of maneuver. It is the minimum essential effects to accomplish the purpose" (FM 101-5-1 1997, 151).

Major Morton Orlov II suggests in his monograph, "Definitions and Doctrine: Operational Language and Understanding in Combined Arms Warfare," that operational terms, such as operation, mission, and task, are not aligned across the Army's doctrine, and that potential ambiguity exists within the battlefield operating systems concerning their use and meaning (Orlov 1993, 14-41). For the purposes of this study, a combat mission is defined as a set of instructions that detail the who, what, when, where, and why of a military action. More specifically, the "what" of the mission contains the type

of operation that the unit will conduct and the tactical task that the unit must, at a minimum, complete. The "why" is stated in the purpose for which the mission is assigned (figure 1).

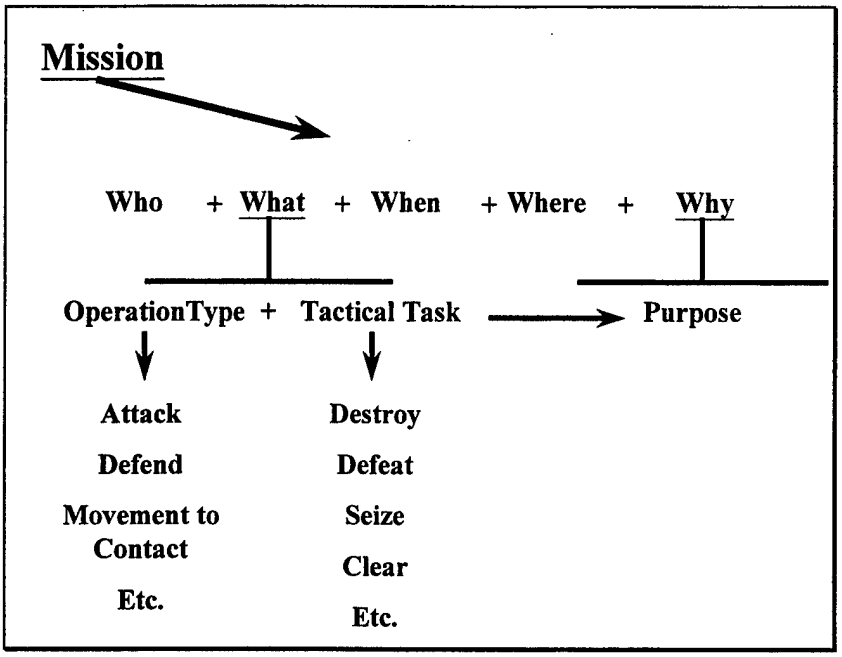

Figure 1. Components of a Mission Statement

This study will initially identify the doctrinal infantry operations. It will then attempt to select the most frequently executed infantry operations at JRTC and NTC and from them, develop the most common missions executed by infantry battalion and brigades by identifying the most common tactical tasks and generic purposes that apply to the most commonly performed infantry operations. By doing so, this study will attempt to determine a set of conditions that will best define the types of combat actions that fires are required to support.

ARTEP 7-30-MTP, *Mission Training Plan for the Infantry Brigade*, explains that missions, although never standardized, are usually associated with a "general category of a type of operation. Offensive, defensive, and retrograde are the critical brigade operations" (ARTEP 7-30-MTP 1989, 2-1). Critical infantry battalion operations include those that apply to the infantry brigade plus two additional types of operations; movement to contact, and reconnaissance and security (ARTEP 7-20-MTP 1988, 2-1). Critical combat related infantry brigade and battalion missions, therefore, must derive a type of operation from one of the five critical infantry operations as outlined in the 7-series MTPs.

FM 7-20 and FM 7-30 expand these critical operations to include subordinate types of operations that infantry brigades and battalions execute. Those that apply to the critical brigade and battalion operations are in table 1 (note that FM 7-20 and FM 7-30 include the movement to contact as a type of offensive operation and do not list it as a separate type).

Table 1. Brigade and Battalion Operations

Offensive	Defensive	Reconnaissance and Security	Retrograde
Movement to Contact Hasty Attack Deliberate Attack Spoiling Attack Exploitation Attack of a Strongpoint Pursuit Counterattack	Defend from Battle Positions Defend in Sector Perimeter Defense Defend a Strongpoint	Guard Screen Counter-reconnaissance	Withdrawal Passage of Lines Retirement Delay

(FM 7-20 1992, chaps. 3-5; and FM 7-30 1995, chaps. 4-6)

ARTEP 7-30-MTP, *Mission Training Plan for the Infantry Brigade (Command Group and Staff)*, contains a list of broad collective tasks from which the infantry brigade can choose to build a training program. Interestingly, the collective tasks which apply to the maneuver BOS of an infantry brigade (attack, defend, perform movement to contact, delay, withdraw, and perform passage of lines) closely resemble the types of operations described in FM 7-30. ARTEP 7-20-MTP, *Mission Training Plan for the Infantry Battalion*, provides a much larger list of collective tasks which an infantry battalion can perform. Each operation listed above can, and most likely would, contain a combination of several collective tasks from this MTP. In fact, many of the collective tasks listed in the MTP would probably apply to several of the above operations and as a result, can be accounted for by considering the broader operation. For these reasons, this thesis limits its investigation to the types of operations provided in the field manuals.

Now that this study has outlined the type of combat operations that infantry brigades and battalions can perform, it will attempt to more closely define the number and type of doctrinal infantry combat operations to consider by looking at which operations infantry units most often execute when training at the NTC and JRTC. A review of seventeen JRTC rotations over a period from January 1996 to April 1998 reveals the table 2 breakdown of the total 52 infantry brigade and 113 infantry battalion operations conducted.

What this reveals is that three types of infantry operations account for 79 percent of all brigade and 86 percent of all battalion operations conducted by elements of active duty light divisions while training at the JRTC over a recent two-year period. These

operations were planned and executed by light infantry brigades and battalions operating in a wooded environment with predominately restrictive terrain. Movements to contact and search and attack operations were conducted against well-armed and well-trained, enemy guerilla units, terrorist cells and special operations forces attempting to identify and target key personnel, equipment, or facilities using helicopters, mortars, mines, missiles, and small arms fire. Deliberate attacks and defenses in sector were conducted against a brigade of motorized and mechanized infantry, tank forces, and special operations forces supported by artillery, fixed wing close air support (CAS), helicopters, and air defense weapons attempting to destroy the US forces and or defend key terrain (JRTC web site...www.jrtc-polk.army.mil/opfor/Mission.htm).

Table 2. JRTC Infantry Brigade and Battalion Operations

Brigade Operations	**Number**	**Percentage**
Movement to Contact/Search and Attack	14	27%
Defend in Sector	13	25%
Deliberate Attack	14	27%
Other	11	21%
Total	52	100%
Battalion Operations	**Number**	**Percentage**
Movement to Contact/Search and Attack	27	24%
Defend in Sector	32	28%
Deliberate Attack	38	34%
Other	16	14%
Total	113	100%

(Operations Group JRTC, Rotations 96-03, 96-04, 96-05, 96-07, 96-09, 96-10, 97-01, 97-02, 97-03, 97-04, 97-06, 98-01, 98-02, 98-03, 98-04, 98-05, 98-06)

A further breakdown (table 3) of the most commonly performed operations is necessary to determine the tactical tasks that are most often associated with them, as well as some generic purposes, in order to establish a list of missions.

Table 3. Breakdown of Common JRTC Missions

Common JRTC Operations	**Number of. Missions**	**Tactical tasks**	**Number/ Percentage**
Movement to Contact/ Search and Attack	41	Destroy	18 / 44 %
		Defeat	8/ 19 %
		Clear	4/ 10 %
		Undetermined	11/ 27 %
		(Total)	(41/ 100 %)
The prevailing generic purpose for movement to contact operations was to prevent enemy access to specific areas of operations or cities.			
Deliberate Attack	52	Destroy	18/ 34 %
		Seize	12/ 23 %
		Clear	3/ 6 %
		Isolate	3/ 6 %
		Undetermined	16/ 31 %
		(Total)	(52/ 100 %)
The prevailing generic purpose for attacks was to facilitate the passage of a friendly unit.			
Defend in Sector	45	Destroy	21/ 47 %
		Defeat	9/ 20 %
		Undetermined	15/ 33 %
		(Total)	(45/ 100 %)
The prevailing generic purpose for defending in sector was to either protect a friendly unit flank or to prevent the enemy from penetrating beyond a certain area.			

(Operations Group JRTC, Rotations 96-03, 96-04, 96-05, 96-07, 96-09, 96-10, 97- 01, 97-02, 97-03, 97-04, 97-06, 98-01, 98-02, 98-03, 98-04, 98-05, 98-06)

Therefore, this review can conclude that infantry brigades and battalions fighting in restrictive, wooded terrain against a insurgent guerrilla and regular army mechanized force would most likely perform the following missions:

1. Deliberate attack to destroy an enemy force on an objective in order to facilitate the passage of another friendly unit.

2. Conduct movement to contact /search and attack to destroy enemy forces in zone in order to prevent enemy access to an area of operation.

3. Defend in sector to destroy an enemy attacking force in order to prevent the enemy force from penetrating beyond a certain area.

A review of eight heavy-light NTC rotations over a period from August 1996 to February 1998 reveals the table 4 breakdown of the thirty-two total light infantry battalion operations conducted:

Table 4. NTC Light Infantry Battalion Operations

Infantry Battalion Operations	**Number**	**Percentage**
Movement to Contact	2	6.5 %
Defend in Sector	8	25 %
Defend a Battle Position	2	6.5 %
Deliberate Attack	16	50 %
Other	4	12 %
Total	32	100 %

(Operations Group NTC, Rotations 96-04, 97-06, 97-07, 97-09, 97-10, 98-02, 98-03, and 98-05)

What this reveals is that two types of infantry operations account for over 75 percent of all battalion operations conducted by light infantry battalions attached to heavy brigades while training at the NTC over a recent two year period. These operations were performed by light infantry battalions operating as part of a mechanized brigade in a

mountainous desert environment against an opposing mechanized regiment supported by artillery, fixed wing CAS, helicopters, and air defense weapons attempting to destroy the US forces or seize/defend key terrain.

As before, a further breakdown (table 5) of the most commonly performed operations is necessary to determine the tactical tasks that are most often associated with them, as well as some generic purposes, in order to complete the list of infantry missions for this study.

Table 5. Breakdown of Common NTC Missions

Common NTC Operations	**Number of. Missions**	**Tactical tasks**	**Number/ Percentage**
Deliberate Attack	16	Destroy	13/ 81 %
		Seize	2/ 12 %
		Secure	1/ 6 %
		(Total)	(16/ 100 %)
The prevailing generic purpose for the attacks was to create an assailable flank on an enemy defensive position for the friendly mechanized brigade to penetrate and attack.			
Defend in Sector	8	Block	7/ 87.5 %
		Defeat	1/ 12.5 %
		(Total)	(8/ 100 %)
The prevailing generic purpose for defending in sector was to prevent the enemy from penetrating beyond a certain area and enveloping the main effort.			

(Operations Group NTC, Rotations 96-04, 97-06, 97-07, 97-09, 97-10, 98-02, 98- 03, and 98-05

Therefore, it can be deduced that infantry battalions fighting in a mountainous desert environment with limited restrictive terrain as part of a heavy mechanized brigade

against an enemy mechanized regiment would most likely perform the following missions:

1. Deliberate Attack to destroy an enemy mechanized platoon or dismounted infantry company on an objective, in order to create an assailable flank on the enemy battalion defensive position and facilitate the attack of the mechanized brigade.

2. Defend in sector to block an enemy attacking force, in order to prevent the enemy force from penetrating beyond a certain area and enveloping the brigade main effort.

The combined results of the analysis of infantry operations at the JRTC and NTC provide this research effort with the infantry mission base. This is the standard for which all subsequent data will be applied (figure 2). This work intends to validate its selected subset of doctrinal infantry missions, in essence its starting point, by comparing the set of selections to representative unit METLs. (What should result is an infantry mission base for which all subsequent data can be screened, tailored, and limited.)

Research Question 2: Fire Support Tasks

The next step is to determine the fire support tasks that are essential to supporting the infantry mission base. After discussing the definition of a fire support task, this portion of the analysis will compile relevant fire support doctrine, Combat Training Center TTP, and suggestions from professional military journals to discover the tasks required from available fire support systems to support each of the missions in the infantry mission base.

INFANTRY MISSION BASE

1. Deliberate Attack to destroy an enemy force on an objective, in order to facilitate the passage of another friendly unit.
   * Conditions: Enemy - Motorized Infantry Brigade
     Terrain - Restrictive, foliated
     Task Organization - Infantry brigade (light)
     Visibility - Both day and night

2. Conduct movement to contact/ search and attack to destroy enemy forces in zone, in order to prevent enemy access to an area of operation.
   * Conditions: Enemy - Guerilla forces and SOF
     Terrain - Restrictive, foliated
     Task Organization - Infantry brigade (light)
     Visibility - Both day and night

3. Defend in sector to destroy an enemy attacking force, in order to prevent the enemy force from penetrating beyond a certain area.
   * Conditions: Enemy - Motorized Infantry Brigade
     Terrain - Restrictive, foliated
     Task Organization - Infantry Brigade (light)
     Visibility - Both day and night

4. Deliberate attack to destroy an enemy mechanized platoon or dismounted infantry company on an objective, in order to create an assailable flank on the enemy battalion defensive position, and facilitate the attack of the mechanized brigade.
   * Conditions: Enemy - Mechanized Regiment
     Terrain - Mountainous, desert
     Task Organization - Infantry Battalion attached to Mechanized Brigade
     Visibility - Both day and night

5. Defend in sector to block an enemy attacking force, in order to prevent the enemy force from penetrating beyond a certain area and enveloping the brigade main effort
   * Conditions: Enemy - Mechanized Regiment
     Terrain - Mountainous, desert
     Task Organization - Infantry Battalion attached to Mechanized Brigade
     Visibility - Both day and night

Figure 2. Infantry Mission Base

Fire Support Planning for the Brigade and Below, an interim doctrinal fire support publication from the U.S. Army Field Artillery School dated 12 May 1998, defines an essential fire support task (EFST) as a "task for fire support to accomplish that is required to support a combined arms operation. . . . A fully developed EFST has a task, purpose, method and effects. The **task** describes what targeting objective . . . fires must achieve on an enemy formation's function or capability. The **purpose** describes why the task contributes to maneuver. The **method** describes how the task will be accomplished. . . . **Effects** quantify successful accomplishment of the task" (U.S. Army Field Artillery School 1998, 19). FM 6-20-10, *Tactics, Techniques, and Procedures for The Targeting Process,* describes targeting objectives as terms that "focus assets on enemy capabilities that could interfere with the achievement of friendly objectives" (FM 6-20-10 1996, 1-1). Although FM 6-20-10 provides the terms limit, disrupt, delay, divert, destroy, and damage as targeting objectives, the terms "disrupt, delay, or limit are the ones most commonly used" (U.S. Army Field Artillery School 1998, 22). This study will use the task and purpose elements of the EFST convention as outlined above to describe the fire support tasks necessary to support the infantry mission base. This work will use the method part of the EFST to outline possible fire support assets that could perform the stated tasks. Those applicable to light divisional direct support field artillery battalions will be further addressed as this chapter progresses. This analysis will not attempt to determine the effects portion of each EFST since it is highly subjective, better for units to develop for themselves, and provides this research effort with no additional value.

By grouping the five missions in the infantry mission base into three groups based on the type of operation the mission involves, and by sequentially analyzing each mission group, this study will identify generic EFSTs for each. Since the existing fire support and infantry field manuals do not use the EFST format to outline the tasks that fire support assets should collectively accomplish in support of a type of operation, this analysis must combine the doctrinal fire support considerations with data from CTCs and professional journals to deduce EFSTs for each mission.

Both Mission 1 (figure 3) and Mission 4 (figure 4) involve conducting a deliberate attack.

Mission 1: Deliberate Attack to destroy an enemy force on an objective, in order to facilitate the passage of another friendly unit.

Conditions: Enemy – Motorized Infantry Brigade
Terrain – Restrictive and foliated
Task Organization – Infantry brigade (light)
Visibility – Both day and night

Figure 3. Mission 1 from Infantry Mission Base

Mission 4: Deliberate Attack to destroy an enemy mechanized platoon or dismounted infantry company on an objective, in order to create an assailable flank on the enemy battalion defensive position, and facilitate the attack of the mechanized brigade.

Conditions: Enemy - Mechanized Regiment
Terrain - Mountainous, desert
Task Organization - Infantry Battalion attached to Mechanized Brigade
Visibility - Both day and night

Figure 4. Mission 4 from Infantry Mission Base

FM 6-20-50 and FM 7-30 provide the following fire support tasks as necessary to consider when planning and executing a deliberate attack:

1. Preparation fires on the enemy objective may be used, but they forfeit surprise. If fires are used, the assault must quickly follow the preparation. Consider echeloning fires from larger (artillery) to smaller (mortar) systems.

2. Suppressive fires on enemy direct fire systems to help maneuver use direct fire systems to engage them.

3. Smoke to screen movement, obscure vision from enemy observation posts (OPs), and help in breaching operations.

4. Block movements of reserves and follow-on forces into the close-in battle area (FM 6-20-50 1990, chap.3; FM 7-30 1995, chap. 4).

Data from both CTCs support the use of preparation fires on the objective. Lessons learned, however, suggest that the intent of preparation fires should be to destroy a certain portion or percentage of the enemy defensive positions to create favorable conditions by attacking high payoff targets or reducing force ratios to advantageous levels. These objectives are best achieved with either precision munitions, accurate, concentrated, and massed artillery fires, or close air support (Kelly 1999). These techniques, although effective at destroying specific vehicles or concentrations of troops, are not necessarily appropriate for suppressing a large area or battle position in order to support the assault and maneuver of attacking infantry forces. Since the objective during the approach, breach, and assault phases of an attack is to prevent the enemy from engaging friendly elements with direct fire and observation, suppressive fires should be

spread across the entire objective to cover as much of the enemy firing positions as possible (Brandt 1994, 41). This requires indirect fires to engage many different simultaneous targets, with a lesser degree of necessary accuracy, for a sustained period of time. Because of the varying minimum safe distances for different indirect fire weapon systems, sustained fire requires attacking units to echelon available indirect fire assets as the attack progresses towards the enemy objective (Pritchard and Harris 1997, 12-21). For the purposes of this paper, this type of suppression is referred to as assault fires. Considering this, two fire support tasks (figure 5) evolve.

Essential Fire Support Task 1: Preparation Fires
Task: Destroy a specified # of high payoff targets and/or % of enemy infantry on the objective.
Purpose: Create favorable force ratios prior to committing the attack.
Method: Close air support with accurate, massed artillery fires and/or precision munitions.

Essential Fire Support Task 2: Assault Fires
Task: Disrupt the enemy on objective from effectively engaging attacking forces with direct fires.
Purpose: Allow infantry to close and engage the enemy with direct fires.
Method: Echeloning artillery and mortar suppressive fires across the objective.

Figure 5. Essential Fire Support Tasks 1 and 2

Included in any attack is the probability that the infantry element will have to breach, bypass, or otherwise negotiate enemy tactical and protective obstacle belts. In order for this to be successful, the breaching fundamentals (Suppress, Obscure, Secure,

Reduce) as detailed in FM 90-13-1, *Combined Arms Breaching Operations*, should be employed. Fire support assets normally assist in accomplishing suppression and obscuration during breaching operations (FM 90-13-1 1991, chaps. 2-4). Assault fires, as described in EFST 2, provide the suppression to support breaching operations during the attack. An additional task (figure 6) detailing obscuration, however, is necessary.

Essential Fire Support Task 3: Obscuration Fires
Task: Limit the enemy's ability to effectively observe the actions of the breach force and assault force vicinity the point of breach.
Purpose: Allow breach force to reduce enemy obstacle and assault force to commence the assault to secure the far side.
Method: Continuous artillery and/or mortar smoke screen between enemy within direct fire range of the point of breach and the obstacle.

Figure 6. Essential Fire Support Task 3

Observations from JRTC and NTC support the necessity for fire support assets to interdict the ability of the enemy to commit reserve forces to counterattack or reinforce the objective. Defending battalions of the Motorized Infantry Brigade at JRTC and the Mechanized Regiment at NTC normally employ a Motorized Rifle Platoon as their reserve. This force is a mobile, armored element usually consisting of three enemy armored personnel carriers (BMP) and a tank. The most desirable approach is to attack this reserve in its assembly area. The enemy reserve's dispersion and the competing requirements for the existing fire support assets make this option very difficult to execute. Effective interdiction of this reserve can be achieved by attacking it with a combination

of close air support, scatterable mines, and massed, accurate, artillery fires at restrictive points along its expected avenue of approach toward the objective (Bushey 1999; Morschauser 1999). Synthesizing this data results in figure 7.

Essential Fire Support Task 4: Blocking Fires
Task: Delay the enemy's reserve from effectively reinforcing his position or conducting a counterattack on the objective.
Purpose: Allow the attacking force to consolidate, reorganize, and establish hasty defensive positions oriented on the reserve avenue(s) of approach.
Method: Close air support, scatterable mines, and/or continuous massed artillery fires at restrictive terrain along the enemy avenue(s) of approach.

Figure 7. Essential Fire Support Task 4

Mission 2 (figure 8) from the infantry mission base involves conducting movements to contact and searches and attacks.

Mission 2: Conduct movement to contact/search and attack to destroy enemy forces in zone in order to prevent enemy access to an area of operation.
Conditions: Enemy – Guerilla forces and SOF
Terrain – Restrictive, foliated
Task Organization – Infantry Brigade (light)
Visibility – Both day and night

Figure 8. Mission 2 from Infantry Mission Base

FM 6-20-50, FM 6-71, and FM 7-30 provide the following fire support tasks as necessary to consider when planning and executing a movement to contact:

1. The key fire support task during a movement to contact is to provide immediate responsive fires to the maneuver units initially making contact (FM 7-30 1995, chap. 4).

2. Fire immediate suppression missions to help the maneuver force get within range of the enemy direct fire weapon systems (FM 6-20-50 1990, chap. 3).

3. Maximize the use of priority targets along the axis of advance. Activate and cancel on the basis of the movement of the forward element (FM 6-71 1994, chap. 4).

A search and attack is a type of movement to contact that is characterized by highly decentralized small unit actions (FM 7-20 1992, 3-18 –23), and according to this study's research, the search and attack is the predominant type of movement to contact operation that infantry battalions perform. Observations from the JRTC reveal that the majority of enemy engagements resulting from search and attack operations occur in heavily wooded terrain within 200 to 300 meters of the enemy. Due to the nature of these engagements and the close proximity of both friendly and enemy forces, it becomes extremely difficult for units to initially execute indirect fires directly on the enemy. Because of the size and composition of their forces, the enemy uses ambush techniques to maximize their ability to inflict casualties, then withdraws before becoming decisively engaged. A more appropriate and executable employment of fire support is to execute artillery or mortar fires to isolate or block the enemy from withdrawing, enabling the infantry unit in contact to maneuver to destroy them with direct fires (Janosko 1996, 33). These considerations and observations describe the components of the EFST in figure 9.

Essential Fire Support Task 5: Immediately Responsive Suppressive Fires
Task: Disrupt ability of enemy squads to withdraw once in contact.
Purpose: To allow unit in contact to fire/ maneuver and destroy with direct fires.
Method: Execute priority targets with artillery or mortars. Provide a sustained

Figure 9. Essential Fire Support Task 5

Mission 3 (figure 10) and Mission 5 (figure 11) involve conducting defenses in sector.

Mission 3: Defend in sector to destroy an enemy attacking force, in order to prevent the enemy force from penetrating beyond a certain area.

Conditions: Enemy - Motorized Infantry Brigade
Terrain - Restrictive, foliated
Task Organization - Infantry Brigade (light)
Visibility - Both day and night

Figure 10. Mission 3 from Infantry Mission Base

Mission 5: Defend in sector to block an enemy attacking force, in order to prevent the enemy force from penetrating beyond a certain area and enveloping the brigade main effort

Conditions: Enemy – Mechanized Regiment
Terrain - Mountainous, desert
Task Organization – Infantry battalion attached to Heavy Brigade
Visibility - Both day and night

Figure 11. Mission 5 from Infantry Mission Base

FM 6-20-50, FM 6-71, and FM 7-30 provide the following fire support tasks as necessary to consider when planning and executing a defense in sector:

1. Execute fires to neutralize or destroy the enemy's reconnaissance effort (FM 6-71 1994, chap. 4)

2. Plan fires to help friendly scout elements move and disengage.

3. Plan fires to delay enemy

4. Use close air support and massed fires on deep targets

5. Canalize the enemy into choke points and engagement areas

6. Mass fires on choke points and engagement areas to inflict maximum early casualties

7. Isolate lead echelons from follow-on forces with field artillery delivered scatterable mines and smoke

8. Use fires to help maneuver move and disengage from enemy forces and reposition

9. Mass fires with priority targets to maximize casualties on enemy elements halted or bunched by obstacles

10. Use fires on top of obstacles to hinder breaching attempts and to destroy breaching teams or equipment

11. Use fires to the sides of obstacles to hinder enemy attempts to bypass obstacles

12. Use fires behind the obstacle to destroy the enemy piecemeal as he passes through the obstacle

13. Assign and fire final protective fires to preclude the enemy's breaching of defenses (FM 6-20-50 1990, chap. 3).

Even with unlimited fire support assets and observers, executing all the considerations on this list in support of a defense in sector would be difficult, if not impossible for an infantry brigade to accomplish. As with any mission, the unit commander will determine which of the considerations are executable and imperative to his concept of the operation. Every field manual that this study has referenced for information on defensive operations mentions that defending units should attempt to attack the enemy at long ranges before he reaches the main battle area, in order to disrupt the momentum of his attack. For the purposes of this paper, fires that attempt to affect enemy forces not yet in contact with friendly forces are termed deep fires.

The ranges at which infantry brigades are able to engage the enemy can vary greatly depending on their available assets and their higher unit's situation. Due to restrained ammunition resupply capabilities normally associated with contingency operations, such as those replicated at the JRTC, and overall limited effectiveness, artillery is not the preferred method to engage moving enemy elements. The most effective technique to execute deep fires is to employ air or artillery delivered scatterable mines in conjunction with fixed and/or rotary wing close air support (Brandt 1994, 41). Artillery can be effective, however, when massed on large enemy formations at areas along avenues of approach where the terrain is restrictive and the enemy's rate of march is significantly slowed. Initially, commanders may use deep fires to disrupt the attacker's momentum and attrit his formations; however, the prevailing reason for executing deep

fires is to isolate enemy echelons and allow defenders to fight a sequential battle in the main battle area (Morschauser 1999). Thus, the task in figure 12 develops.

Essential Fire Support Task 6: Deep Fires
Task: Delay the ability of follow-on enemy echelons to support units in contact.
Purpose: Allow defending unit to fight enemy echelons sequentially.
Method: Close air support, scatterable mines, and/or massed artillery fires at restrictive points along the enemy avenue(s) of approach.

Figure 12. Essential Fire Support Task 6

Counterreconnaissance consists of the coordinated effort of two functions, finders and killers (FM 7-20 1992, 4-7-4-11). The killing function is normally best performed by maneuver and aviation elements with direct fire systems employed throughout the brigade security area (Bushey 1999). Although difficult to employ effectively, fire support can contribute to the counterreconnaissance effort. Copperhead, an artillery-delivered, laser-guided projectile, can be effective at engaging stationary enemy reconnaissance vehicles in open areas. Immediately responsive illumination and suppressive fires can temporarily fix enemy reconnaissance elements to allow maneuver to find and engage them (Morschauser 1999). A fire support task concerning counterreconnaissance develops as shown in figure 13.

Essential Fire Support Task 7: Counterreconnaissance Fires
Task: Disrupt ability of stationary enemy reconnaissance elements to identify and report friendly unit defensive positions.
Purpose: To preserve the security of defensive positions and maximize the effectiveness of the engagement areas.
Method: Precision munitions, artillery/ mortar illumination and suppression priority targets.

Figure 13. Essential Fire Support Task 7

Every field manual and professional article that this study has referenced for information on defensive operations or obstacle emplacement mentions that obstacles should be covered with direct fire, indirect fire, and observation. Most publications, however, do not describe how to cover obstacles with indirect fires. Major Roberto L. Vasquez, a small group instructor for the Field Artillery Officer Advanced Course, provides some particularly useful information in his article, "Fires in Support of Obstacles: Matching the Fires Intent with the Obstacle Intent," published in *Field Artillery* (a professional journal for field artillerymen) in September-October 1998. Major Vasquez suggests that indirect fires should support the obstacle effect. The obstacle effect is:

> the intended effect that the commander wants the obstacles and fires to have on the enemy. . . .
>
> It is important to remember that obstacle effects occur because of fires and obstacles, not just obstacles alone. All tactical obstacles produce one of the following obstacle effects: Disrupt, Turn, Fix, and Block. . . .
>
> The disrupt effect focuses fire planning and obstacle effort to cause the enemy to break up its formation and tempo, interrupt its timetable, commit breaching assets prematurely, and piecemeal the attack. . . .
>
> The turn effect integrates fire planning and obstacle effort to divert an enemy formation off one AA to an adjacent AA or into an EA [Engagement Area]. . . .

> The fix effect focuses fire planning and obstacle effort to slow an attacker within a specified area, normally an EA. . . .
>
> The block effect integrates fire planning and obstacle effort to stop an attacker along a specific AA or prevent him from passing through an EA (FM 90-7 1994, chap. 2)

Major Vasquez proposes that targeting objectives can be habitually associated with the obstacle effects. If the obstacle effect is to disrupt, fires should have the same targeting objective. To support a turning obstacle, fires should limit enemy movement to only the desired direction. Fires that delay enemy forces can best support a fixing obstacle. Fires can best support a blocking obstacle by destroying enemy forces as they attempt to breach. Each targeting objective can be achieved by firing artillery target groups. Fire support planners alter the number, location, and type of artillery targets within the groups, to include the enemy formation and activity that triggers the fires, to meet the different targeting objectives (Vasquez 1998, 31-34). The fire support task in figure 14 summarizes these thoughts.

Essential Fire Support Task 8: Obstacle Support and Engagement Area Fires
*Task: (Block) Destroy enemy elements attempting to breach the obstacle.
(Fix) Delay enemy movement through the obstacle belt/ EA.
(Disrupt) Disrupt enemy ability to mass fires.
(Turn) Limit enemy movement to the desired direction.
Purpose: To enhance/ augment the desired effect of the obstacle belt.
Method: Execute artillery and/or mortar target groups.

*: (Terms in parentheses refer to the desired obstacle effect)

Figure 14. Essential Fire Support Task 8

A final protective fire (FPF) is an immediately available prearranged barrier of fire designed to impede enemy movement across defensive lines or areas (FM 101-5-1 1997, 1-65). Observations from both JRTC and NTC support the use of FPFs as key components of infantry unit final protective lines (FPLs) (Bushey 1999; Morschauser 1999). The result is the final fire support task specific to the defense in sector (figure 15).

Essential Fire Support Task 9: Final Protective Fires
Task: Disrupt ability of enemy infantry to penetrate friendly defensive positions.
Purpose: Allow infantry unit to disengage from enemy forces, maneuver and reposition within the defense.
Method: Execute a linear priority target with sustained artillery or mortars fires until purpose is achieved or ammunition is depleted.

Figure 15. Essential Fire Support Task 9

Additionally, in the review of fire support, field artillery, and infantry field manuals, this study found the following fire support tasks and considerations as potentially common to all infantry combat operations:

1. Suppress enemy air defense weapons (SEAD)
2. Suppress enemy indirect fire weapons

The consenting opinions of former fire support observer-controllers from both the NTC and JRTC stress the need for units to accomplish both of these tasks. According to their collective comments, units should develop aggressive efforts to actively locate and destroy enemy air defense and indirect fire systems within their area of operations,

capabilities, and higher commander's intent. In addition, enemy air defense should be suppressed during two types of friendly unit actions. The first is when conducting an air assault, and the second is when employing close air support. A complete SEAD program for an air assault entails an aggressive effort prior to the air assault to detect and destroy all air defense systems that can affect the operation. This normally requires assistance from, or is a part of a higher level headquarters' plan. The combined effects of artillery fires, attack helicopter escorts, and communications jamming provide SEAD during the air assault. Artillery SEAD, however, is normally limited to the initial lift since these fires will be needed on the landing zone (LZ) to support infantry actions as part of the ground tactical plan. Nonlethal efforts, such as communications jamming, and attack helicopter escorts, if available, should continue for all lifts and serials of the air assault (Bushey 1999; Kelly 1999).

The other opportunity for SEAD is when employing CAS. Although the aircraft performing the CAS mission will attempt to mitigate the effects of enemy air defense by choosing appropriate final attack headings and by providing their own SEAD in accordance with their capabilities, SEAD from the supported ground force fire support assets is normally required. Timely and accurate intelligence on optically guided and shoulder-fired enemy air defense weapons is extremely difficult to obtain and transfer into targetable data. As a result, fire support observer-controllers suggest that units fire artillery at the target prior to the CAS engagement to suppress any air defense weapons positioned among the enemy formation and to limit the ability of the enemy to engage friendly CAS sorties with small arms. The artillery fires can also assist the pilot in

identifying the target by including marking projectiles like white phosphorous and illumination (Bushey 1999; Kelly 1999; Morschauser 1999). This provides this study with the set of SEAD tasks in figure 16.

Essential Fire Support Task 10a: SEAD Fires for Air Assault
Task: Disrupt enemy air defense weapons from effectively engaging lift aircraft from Pick-up Zone (PZ) to LZ.
Purpose: Allow the initial lift to the insert and secure the LZ.
Method: Detect and attack systems that can affect the route and LZ prior to air assault. Use artillery fires on the initial lift, with attack helicopter escorts and communications jamming during all lifts.
Essential Fire Support Task 10b: SEAD Fires for Close Air Support
Task: Disrupt enemy air defense weapons from effectively engaging close air support sorties from the Initial Point to the target.
Purpose: Allow CAS sorties to attack the target area unhindered by air defense fires.
Method: Artillery target suppression with marking rounds.

Figure 16. Essential Fire Support Tasks 10a and 10b

The final task involves limiting the effectiveness of the enemy's indirect fires on friendly forces. Division and corps artillery headquarters normally perform the counterfire role with assets other than those assigned as direct support. Direct support artillery units, however, are normally responsible for close support fires. These close support fires frequently entail the responsibilities of engaging the enemy's direct support artillery and mortars (FM 6-20-2 1993, 5-4 thru 5-7). Depending on the amount of artillery supporting the brigade, this task may be accomplished by the fires of a reinforcing or attached artillery unit. Other assets, such as CAS, can be used to attack enemy indirect fire systems in a proactive manner. Regardless of the number available,

artillery units will most likely be unable to engage all of the enemy artillery all of the time. Consequently, the infantry brigade should identify the key elements, times, and places that they do not want to receive effective, sustained enemy indirect fires. A realistic goal should be to suppress the enemy artillery that is affecting the brigade's critical elements to force him to displace. To be successful, units should integrate an effective target acquisition plan, including appropriately established radar zones, with responsive suppressive artillery fires (Kelly 1999; Morschauser 1999). The final essential task emerges in figure 17.

Essential Fire Support Task 11: Counter Battery and Mortar Fires
Task: Disrupt ability of enemy mortars and direct support artillery to put effective fire on critical elements at critical times and places on the battlefield.
Purpose: To give BDE unrestricted C2, ability to provide responsive fires & freedom of maneuver
Method: Establish an effective target acquisition plan tied to responsive/ suppressive artillery fires.

Figure 17. Essential Fire Support Task 11

Research Question 3: Artillery Training Doctrine

Now that this study has established the EFSTs necessary to support an infantry brigade, it will explore the MTPs that apply to a DS FA battalion in a light division in order to reveal the fire missions that they provide. This study will then look at *STRAC* to see the qualification requirements and how they are applied to these missions.

Every Field Artillery MTP devotes a chapter containing Training and Evaluation Outlines for all collective tasks for the type unit to which it pertains. Each collective task has a task standard that describes the performance criteria that a unit must achieve to successfully execute the task. To assist units in identifying the proper performance criteria, each collective task contains task steps. "Task Steps are a list of actions that are required to successfully complete the task. These actions are further stated in terms of observable performance measures for evaluating training proficiency. If the unit fails to correctly perform one of these task steps to standard, it has failed to achieve the overall task standard" (ARTEP-6-037-30-MTP 1998, 5-2).

ARTEP–6-037-30-MTP, *Mission Training Plan for field Artillery Cannon Battalion Command and Staff Section, and Headquarters and Headquarters Battery; Headquarters, Headquarters and Service Battery; or Service Battery*, is the MTP for all field artillery cannon battalion headquarters and staffs regardless of their assigned tactical mission. Task number 6-3-22011, Execute Battalion Fire Missions, is the collective task for the battalion fire direction center that outlines the requirements for executing artillery fire missions. Four of the task steps directly state the type of artillery fire missions they are required to be able to execute: Register Battalion Howitzers and Munitions, Process and Fire Battalion Adjust Fire Missions, Process and Fire Battalion Fire-for-Effect Missions, and Process and Fire a Schedule of Fires. These task steps specify the artillery fire missions a battalion must perform to successfully accomplish the collective task of "Execute Battalion Fire Missions." The type of observer or observation device, method of control, type of munitions, and angle of attack (trajectory), differentiate these missions.

Figures 18 and 19 show the remaining specified missions after excluding those that are differentiated by the type of observer or observation device.

BATTALION FIRE MISSIONS (MASS)
Fire-for-effect, When Ready. **Fire-for-effect, At My Command.** **Fire-for-effect, Time on Target (TOT).** **Fire-for-effect, Large Segmented Target.** **Adjust Fire** **Adjust Fire, High-Angle** **Coordinated Illumination.**

Figure 18. Battalion Fire Missions (Mass)

BATTALION FIRE MISSIONS (OTHER)
Fire-for-effect, Immediate Smoke. **Fire-for-effect, Priority Target.** **Fire-for-effect, Immediate Suppression,** **Schedule of Fires.**

Figure 19. Battalion Fire Missions (Other)

ARTEP 6-037-30-MTP, *Mission Training Plan for the Field Artillery Cannon (Consolidated) Firing Battery* is the applicable training and evaluation document for all field artillery cannon batteries. Task number 6-3-22001, Determine Firing Data, is the collective task that applies to the battery fire direction center which outlines the types of

fire missions that they must be able to execute. According to the task steps under this task, a battery trains to execute the fire missions listed in figures 20 and 21.

BATTERY FIRE-FOR-EFFECT MISSIONS

Fire-for-effect, When Ready.
Fire-for-effect, At My Command.
Fire-for-effect, Time on Target (TOT).
Fire-for-effect, Priority Target.
Fire-for-effect, Final Protective Fire.
Fire-for-effect, Immediate Suppression.
Fire-for-effect, Immediate Smoke.
Fire-for-effect, Smoke.
Fire-for-effect, Large Irregular Shaped Target.
Schedule of Fires.
Counterfire.

Figure 20. Battery Fire-for-Effect Missions

BATTERY ADJUST FIRE MISSIONS

Adjust Fire, Time in Effect.
Adjust Fire, Simultaneous Missions.
Adjust Fire, High-Angle.
Adjust Illumination.
Adjust Fire, Coordinated Illumination.
Adjust Quick Smoke

Figure 21. Battery Adjust Fire Missions

Chapter 3 of DA Pam 350-38, *Standards in Weapons Training (STRAC)* provides weapon qualification standards and suggested training strategies for field artillery units equipped with the 105mm Howitzer. The training strategies are suggested whereas the qualification standards are mandatory requirements. *STRAC* mandates that active component field artillery cannon batteries and battalions must "live-fire 80 percent of their METL related fire missions to ARTEP MTP standards twice annually" (DA Pam 350-38 1997, 30). *STRAC* provides a table of annual fire mission requirements (table 6) for all DS batteries and battalions in light divisions (105 mm):

STRAC recommends that field artillery units use the Artillery Tables in the MTPs as the basic training strategy for developing a training program to meet the qualification standards for their type of howitzer or artillery weapon system. "The Artillery Tables (AT) provide a comprehensive list of gunnery tasks, both firing and nonfiring, that commanders can use to help develop their training strategy. The tables provide the structure for a progressive and sequential gunnery training strategy using dry-fire certification before live-fire qualification" (ARTEP 6-037-30-MTP 1998, D-1). The Artillery Tables are designed, therefore, to be a menu of collective tasks to train the gunnery team. MTPs encourage commanders to modify the tables to meet their units' METLs.

Table 6. Table 3-3 from *STRAC*.

Table 3-3
105mm How Battalion Annual Requirements to Train Fire Tasks (Fire Missions) identified in MTP

		3 X 6 TRC A&B/C	
Fire Mission	CS[1]	Btry	Bn
Echelons Above Bn Mass			X
FFE (Bn Mass)			X
Engage a Moving Target Array		X	X
Low Angle Adjust	X	X	X
Precision Reg		X	X
High Burst/MPI		X	X
High Angle Adjust (Radar or FO)		X	X
Coordinated Illum	X		X
FPF Adjust	X	X	
Simultaneous Mission	X	X	
Emergency Mission		X	
Quick Smoke		X	
Irregularly Shaped Target			X
TOT	X	X	X
Schedule of Fires	X	X	X
Immediate Suppression	X	X	
Priority Target	X	X	
Illumination		X	
Direct Fire		X	
MET + VE		X	X
MET to Target (outside transfer limits)			X
Smoke	X	X	
Immediate Smoke	X	X	
FFE Mass		X	
Sweep and Zone	X	X	
Assault Fire	X	X	
FFE Chemical		X	X
FFE ICM		X	X

Note:
1. Close Support

(DA PAM 350-38 1997, 31-32)

Many unit METLs, however, are not descriptive enough to assist commanders in effectively identifying which MTP fire missions to execute and determining whether or not to modify them in order to best train the gunnery team to meet the mission essential demands of the infantry units they support. Colonel Robert J. Reese, commander of the

10th Mountain Division Artillery, discusses this phenomenon in his article, "Linking the FA METL to Brigade TF Success," in a recent professional journal. His observations over the last ten years indicate that most FA battalions have similar looking METLs. The tasks are far too generic and do not help focus one's training (Reese 1999, 20-24). A review of direct support artillery battalion METLs in both the 25th Infantry Division Artillery and the 82nd Airborne Division Artillery supports this conclusion (figures 22 and 23). Even the sample battalion METL in artillery battalion MTP indicates this trend (figure 24).

Battalion METL from 25th Infantry Division Artillery
Deploy
Coordinate Fire Support
Acquire Targets
Deliver Fires
Move
Communicate
Survive
Maintain and Re-Supply

Figure 22. FA Battalion METL from 25th ID (3-7 FA 1998)

Battalion METL from 82d Airborne Division Artillery
Execute RSOP
Conduct Airborne Assault
Synchronize/ Integrate Fire Support
Mass FA Fires
Sustain the Battalion
Command & Control Reinforcing FA
Protect the Force

Figure 23. FA Battalion METL from 82D ABN DIV (3-319 AFAR 1999)

Sample Artillery Battalion METL in MTP

Prepare for Deployment.
Deploy to Operational Theaters.
Command and Control Battalion Operations.
Move.
Deliver Artillery Fires.
Sustain Combat Operations.
Perform Survivability Operations.

Figure 24. Sample METL for an Artillery Battalon
(ARTEP 6-115-MTP 1997, 3-1)

It appears as if artillery units are only using the METL as a management tool to help visualize and assess their training readiness. This is only part of the reason behind establishing a METL. More importantly, a METL should help focus the unit's training to only those tasks that are essential to accomplishing its wartime mission. With METL tasks, such as "Deliver Artillery Fires" and "Mass FA Fires," it is very difficult for commanders and their staffs to determine the specific fire mission requirements for the gunnery team to train. Consequently, many units end up executing most, if not all, of the tasks listed in the MTP as a means to qualify their weapon systems and validate the gunnery team's ability to execute fire missions to Army standards. The question is whether or not the fire missions listed in the MTP and in *STRAC* contribute to accomplishing the EFSTs derived earlier. The best way to determine the answer is to develop a realistic fire mission list that supports the EFSTs of an infantry brigade. When completed, this study can easily determine the similarities and differences between what is provided for in the MTPs and what the infantry requires.

Research Question 4: Fire Missions

This next section will look at each of the methods within the previously derived essential fire support tasks to determine how direct support cannon artillery should contribute to accomplishing each associated task. Following a brief review of the capabilities and limitations of a light divisional field artillery battalion, the analysis will highlight required artillery fires and competing demands associated with executing each essential fire support task, resulting in a realistic list of artillery fire missions necessary to accomplish the essential fire support tasks.

Light Divisional Field Artillery Battalion Capabilities and Limitations

All direct support cannon battalions in U.S. Army light divisions are each equipped with eighteen M119 howitzers (Figure 25).

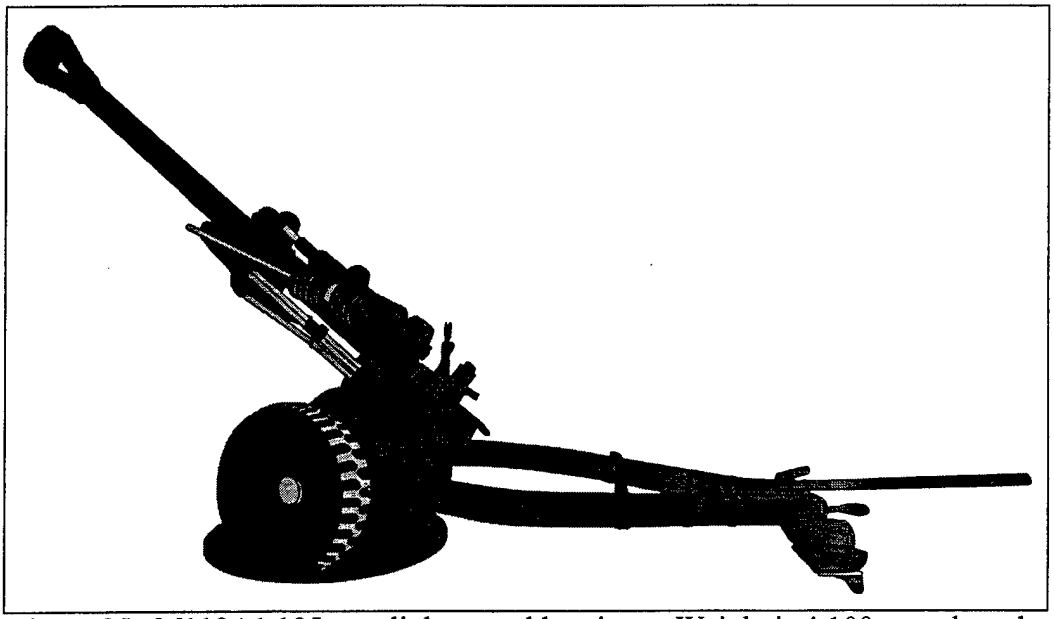

Figure 25. M119A1 105-mm light towed howitzer. Weight is 4,100 pounds and maximum/sustained rates of fire are 6/3 rounds per minute (FM 6-71 1994, app. A)

A cannon battalion equipped with the M119 howitzer:

1. Is organized into three firing batteries, each with six howitzers
2. Provides fires under all weather conditions and types of terrain
3. Shifts and masses fires rapidly without displacing
4. Fires a variety of conventional shell/fuse combinations
5. Provides continuous support by displacing by battalion, echelon, or battery
6. Is as mobile as the supported unit (FM 7-30 1995, chap. 8, sec. 3)
7. Provides first round fire-for-effect (FFE) capability
8. Is an area fire weapon
9. Cannot fire Copperhead, a terminal guidance munition, to destroy point targets
10. Cannot fire artillery delivered scatterable mines (FASCAM)
11. Is best employed when massed on observed targets
12. When firing smoke, is limited in its ability to deliver killing munitions. (FM 6-71 1994, chap. 1)

Artillery Fire Mission Definition

Before proceeding further, this thesis must define the components of an artillery fires mission. FM 101-5-1, *Operational Terms and Graphics*, defines a fire mission as s "specific assignment given to a fire unit as part of a definite plan" (FM 101-5-1 1997, 1-66). For clarification and utility to this study, an artillery fire mission is defined as an approved call for fire resulting in a fire order for an artillery battalion or battery to execute. For the purposes of this thesis, a fire mission consists of six components

described in table 7 (This was derived from combining the elements of a call for fire (FM 6-30 1991, chap. 4) and a battery/ battalion fire order (FM 6-40 1996, chap. 5)).

Table 7. Six Components of a Fire Mission

Component	**Description**
1. Size of Element to Fire-for-effect	Battalion Battery Platoon
2. Type of Mission	Adjust Fire-for-effect
3. Type of Fires	Mass (Defined by # of Volleys) Suppression (Defined by # Minutes) Group Series FPF Sweep and Zone Smoke Illumination
4. Size of Target	Point Circular Linear Large Irregular Shaped
5. Method of Engagement	Danger Close Type of Ammunition Type of Sheaf
6. Method of Control	When Ready (WR) At My Command (AMC) Time on Target (TOT) Continuous Fire Schedule of Fires

Analysis of Essential Fire Support Task Methods

Essential Fire Support Task 1 (Preparation Fires) intends to destroy a specific number of high payoff targets on the enemy objective. The selected method is to engage

the high payoff targets with close air support, massed artillery fires, and precision munitions. The availability of close air support and reinforcing artillery units capable of firing Copperhead projectiles determines the amount of massed fires the DS FA battalion contributes to accomplishing this task. To accomplish this task, the battalion needs to mass the fires of its three firing batteries on successive point or linear targets (depending upon whether the target is a bunker, vehicle position, or trench), each requiring multiple volleys, using a converged sheaf. If the battalion has met the five requirements for accurate and predicted fire, it can execute a fire-for-effect mission, if not, the battalion should begin by adjusting on the target, concluding with firing for effect once the rounds have been effectively adjusted.

The battalion should engage the targets sequentially but not in accordance with a time schedule. The difficulties in locating targets, the potential need for forward observers to adjust the battalion's fires, and the changing conditions of the battlefield will work against the battalion's ability to engage the targets as part of a schedule of fires. Finally, fire-for-effect missions should be executed with an AMC or TOT method of control to attempt to get as many of the rounds in the initial fire-for-effect volley to impact in the shortest amount of time. This limits the enemy's ability to seek cover and increase his protective posture. It is unnecessary for artillery battalions to practice both AMC and TOT missions to be able to habitually accomplish EFST 1. Each unit should choose which method of control works best for them and use it exclusively when executing fire-for-effect missions in support of EFST 1 (Kelly 1999; Morschauser 1999). The artillery fire missions required to accomplish EFST 1 are listed in figure 26.

Preparation Fires

1. Battalion, FFE, Mass, Point Target, Converged sheaf, AMC or TOT
2. Battalion, Adjust, Mass, Point Target, Converged sheaf, WR
3. Battalion, FFE, Mass, Linear Target, AMC or TOT
4. Battalion, Adjust, Mass, Linear target, WR

This study recommends that all of these missions be executed in sequence to replicate the changing conditions on the battlefield due to the fog of war.

Figure 26. Artillery Fire Missions to Support EFST 1

The method to accomplish Essential Fire Support Task 2 (Assault Fires) is to echelon artillery and mortar suppressive fires across the enemy objective to allow the infantry to close with and engage the enemy with direct fires. This requires the DS artillery battalion to distribute its available fires across the entire objective. The DS artillery battalion must begin the suppressive fires prior to the infantry moving within direct fire and observation of the enemy objective. The artillery fires must lift or shift before the infantry approaches to within the minimum safe distance (MSD) determined by the infantry commander. Potential techniques to accomplish this task include executing a sweep and zone, suppressing a large irregular shaped target, or firing a group of targets (segmented into as many as nine firing platoon targets to cover as much of the objective area as possible). The nature of these techniques does not require observed fires; however, the fires will normally be within danger close ranges to the infantry, thus the artillery must be concerned with its ability to meet the five requirements for accurate

predicted fire. All techniques must deliver suppressive fires for the duration of time it requires the infantry to close on the enemy. This will obviously vary depending on the situation. These fires may be executed on a schedule of fires or may be initiated by events. The brigades tactical standard operating procedures (SOP) will determine the selected technique, however event initiated and lifted continuous fires provide units with flexibility to react to changing battlefield situations. The artillery fire missions necessary to accomplish EFST 2 are listed in figure 27 (Morschauser 1999).

Assault Fires

1. Battalion, FFE, Sweep and Zone, Large Irregular Shaped Target, Danger Close, AMC with Continuous Fire until infantry hits the MSD (repeat until given cease loading)

2. Battalion, FFE, Group of Targets, Point Targets, Danger Close, AMC with Continuous Fire until infantry hits the MSD (estimated # of volleys, repeat until given cease loading)

3. Battalion, FFE, Suppression, Large Irregular Shaped Target, Danger Close, AMC with Continuous Fire until infantry hits the MSD (estimated # of minutes)

This study recommends that the battalion modify the required duration of fires during the conduct of the above missions to simulate the fog of war.

Figure 27. Artillery Fire Missions to Support EFST 2

Essential Fire Support Task 3 (Obscuration Fires) is designed to facilitate breaching operations by limiting the enemy's ability to effectively observe the actions of

the breach force and assault force vicinity the point of breach. The derived method involves shooting a continuous artillery or mortar smoke screen between the enemy and the obstacle. The dimensions of this smoke screen vary depending upon the situation; however, most infantry attacks executed at JRTC and NTC require smoke screens of 300 to 500 meters in length (Bushey 1999; Morschauser 1999). The obscuration task, however, is required to happen at the same time that the unit is executing either assault fires or blocking fires. Again, depending on the number of artillery assets available to the brigade, this may require the DS FA battalion to execute multiple (two at a minimum) missions simultaneously. A suggested technique is to use one battery to build and sustain the smoke screen, while the remaining two batteries execute one of the fire mission techniques for assault fires (Bushey 1999; Morschauser 1999). The artillery fire missions for elements of the DS battalion required to accomplish EFST 3 are listed in figure 28.

Obscuration Fires
1. Battery, Adjust, Smoke, 500m Linear Target, Continuous Smoke until the infantry secures the far side of breach (estimated # minutes)
2. Battalion (-) executes one of the missions that support Assault Fires or Blocking Fires
Recommend that DS battalion train to execute these missions simultaneously.

Figure 28. Artillery Fire Missions to Support EFST 3

The intent of Essential Fire Support Task 4 (Blocking Fires) is to delay the enemy's reserve from effectively reinforcing his position or conducting a counterattack on the objective. The method to accomplish this task includes employing close air support, scatterable mines, along with continuous massed artillery fires, if required, at restrictive terrain along the enemy avenue(s) of approach. Again, the availability of close air support will greatly determine the extent of the artillery battalion's involvement in accomplishing this task. Taking a worst-case approach where CAS and an artillery unit capable of firing scatterable mine are unavailable, the DS FA battalion can accomplish EFST 4 by massing continuous fires at choke points along the reserve's avenue of approach coming in to the objective area. If the terrain supports multiple avenues of approach, where the enemy reserve could infiltrate his reserve by vehicle, the battalion could execute this task with up to three battery priority targets to help accomplish the fire support task. If only one avenue of approach exists, then a linear target would most likely be appropriate since all enemy vehicles would most likely use this route. Additionally, due to the probability that the enemy will be moving when attempting to execute this task, units should consider establishing priority targets and/or executing the mission with an At My Command (AMC) method of control. To achieve success in this situation, the DS artillery battalion can execute the following missions listed in figure 29 (Bushey 1999; Morschauser 1999).

Blocking Fires

1. Battalion, FFE, Priority Target, Linear Target, AMC, Continuous Fire until infantry can establish a hasty defense (estimate # volleys, repeat as necessary)

2. Battery, FFE, Priority Target, Point Target, AMC, Continuous Fire until infantry can establish a hasty defense (estimate # volleys, repeat as necessary)

Figure 29. Artillery Fire Missions to Support EFST 4

Essential Fire Support Task 5 (Immediate Responsive Suppressive Fires) is intended to disrupt the ability of enemy squads to withdraw once in contact. The method requires artillery and mortars to execute priority targets with sustained rates of fire until the infantry has maneuvered and destroyed the enemy squads with direct fire. The existing battlefield conditions will dictate the number of priority targets that the artillery battalion is required to provide, up to a maximum of nine platoon targets. A more decentralized concept of the operation will most likely demand more priority targets.

Although fire supporters and their infantry commanders make every attempt to plan and shift priority targets to be able to execute responsive fires at the point of engagement, the nature of these operations normally require an adjustment to the fires after impact. Observer-controllers from the JRTC coach forward observers to make "one bold, accurate shift and fire-for-effect" (Janosko 1996, 33). A potential outcome of any adjustment is a period of time when no fires are impacting on target. To preclude this,

units can continue firing the initial priority target with one platoon while applying the adjustment towards the fire-for-effect portion of a battery adjust fire mission.

A major consideration when executing fires in close proximity to friendly troops is the risk of fratricide. There are a variety of options units can employ to reduce this risk. One technique that units can apply to all types of artillery and mortar missions is to fire the priority targets with a converged sheaf to reduce the size of the bursting pattern on the ground (Hollands 1993b, 44). Considering all of this, artillery units can execute the fire missions in figure 30 to accomplish their portion of EFST 5.

Immediately Responsive Suppressive Fires

1. Platoon, FFE, Priority Target for Suppression, Point Target, Danger Close, Converged Sheaf, Continuous Fire until infantry destroys enemy squad with direct fire (estimate # minutes)

2. Battery, Adjust Fire (using the above platoon priority target as the adjusting element), Suppression, Point Target, Danger Close, Converged Sheaf, Continuous Fire until infantry destroys enemy squad with direct fire (estimate # minutes)

Figure 30. Artillery Fire Missions to Support EFST 5

Essential Fire Support Task 6 (Deep Fires) is designed to delay the ability of follow-on enemy echelons to support units in contact. This is to allow the defending unit to fight enemy echelons sequentially. The selected method to accomplish this task is to use CAS, scatterable mines, and/or massed artillery fires at restrictive points along the enemy avenue(s) of approach. The requirements for artillery fires to assist in

accomplishing this task are similar to the ones required to fulfill EFST 4. Due to the size and tactics of the enemy formations associated with this task, however, artillery fires should focus on a single enemy avenue of approach. The fire mission that remains is listed in figure 31.

Deep Fires
1. Battalion, FFE, Priority Target for Mass, Linear Target, AMC, Continuous Fire until sufficient delay is achieved (estimate # volleys, repeat if necessary).

Figure 31. Artillery Fire Mission to Support EFST 6

The method for accomplishing Essential Fire Support Task 7 (Counterreconnaissance Fires) calls for indirect fire assets to provide precision munitions, illumination and suppression priority targets in order to disrupt stationary enemy reconnaissance elements from identifying and reporting friendly unit defensive positions. The M119 howitzer equipped DS FA battalion can contribute by providing illumination and suppressive fires. Among other considerations, the size of the security area and the counterreconnaissance plan will determine the size of firing element and the number of priority targets established. Illumination, depending upon its location and timing on the battlefield, can help or hinder both friendly and enemy unit activities. As a result, the observer should control each round with a method of control of "By Round AMC." The most likely artillery fire missions needed to support EFST 7 follow in figure 32.

Counterreconnaissance Fires
1. Platoon, FFE, Priority Target for Suppression, Point Target, Continuous Fire until scouts can disengage or infantry can destroy with direct fire (estimate # minutes) 2. Platoon, FFE, Priority Target for Illumination, By Round AMC

Figure 32. Artillery Fire Missions to Support EFST 7

Essential Fire Support Task 8 (Obstacle Support and Engagement Area Fires) requires the artillery to execute target groups in order to enhance and augment the commander's desired effect for an obstacle belt. How the targets are arranged and planned in relationship to the obstacles and the terrain determines whether the artillery fires will assist the obstacle in blocking, fixing, disrupting, or turning the enemy. Considering this, the artillery fire mission that supports the accomplishment of EFST 8 is listed in figure 33.

Obstacle Support and Engagement Area Fires
1. Battalion, FFE, Group of Targets, Point or Linear Targets, AMC (estimate # of volleys to help achieve commander's desired obstacle effect)

Figure 33. Artillery Fire Mission to Support EFST 8

As previously stated, Essential Fire Support Task 9 (Final Protective Fires) is designed to put a wall of steel between the attacking enemy and the defending unit as a desperate measure to allow the defender to maintain his defense. Artillery units achieve this by executing linear priority targets with sustained fires until commanded to cease loading or until ammunition is depleted. This fire mission is exclusively provided for in fire support and artillery doctrine. Adapting the doctrinal FPF to meet the parameters of a fire mission as defined by this results in the mission in figure 34.

Final Protective Fires
1. Battery, FFE, Final Protective Fires, Linear Target, Danger Close, AMC, Continuous Fire

Figure 34. Artillery Fire Mission to Support EFST 9

Essential Fire Support Task 10a (SEAD Fires for Air Assault) is intended to disrupt enemy air defense weapons from effectively engaging lift aircraft from PZ to LZ in order to allow the initial lift to the insert and secure the LZ. As part of the selected method, artillery fires attack systems that can affect the route and the LZ during the initial lift. A proven technique to employ artillery fires in support of this task is to engage known, suspected, and potential enemy air defense positions within engagement range of the selected air assault fight route with a series of targets within a schedule of fires (Bushey 1999). The resulting fire mission for the DS FA is listed in figure 35.

SEAD Fires for Air Assault
1. Battalion, FFE, Series, Point Targets, Schedule of Fires

Figure 35. Artillery Fire Mission to Support EFST 10a

Essential Fire Support Task 10b (SEAD Fires for Close Air Support) calls for artillery fires to suppress the target area and provide marking rounds in order to disrupt enemy air defense weapons from effectively engaging CAS sorties as they attack the target area. Since the targets that demand attack with CAS are normally part of a large enemy formation or position, artillery units should plan to suppress a large area. CAS engagements, however, are likely to be employed at critical moments in a battle. As a result, there may exist additional demands on the artillery at the same time. When multiple artillery battalions are not available, the DS battalion can elect to fire this task with a battery. As part of the suppression mission, firing units can shoot white phosphorus projectiles as part of the engagement to provide a mark for the target at the request of the pilot. Artillery units should be prepared to shoot marking rounds with ground burst illumination or white phosphorous (WP) projectiles as a separate platoon mission when the situation does not require artillery SEAD (Kelly 1999). This results in the artillery fire missions in figure 36.

SEAD Fires for CAS

1. Battery, FFE, Suppression, Large Irregular Shaped Target, AMC (Estimate # minutes)

2. Platoon, FFE, Illumination or Smoke (WP), Point Target, AMC

Figure 36. Artillery Fire Missions to Support EFST 10b

Essential Fire Support Task 11 (Counterbattery and Mortar Fires) requires the artillery to link suppressive fires with the target acquisition plan in order to disrupt enemy indirect assets firing on critical brigade elements at a critical time and place in the battlefield. Because of the competing demands on their available fires, the DS artillery battalions may plan to shoot this mission with a battery or less. If the tactical situation permits identifying a particular firing battery to perform this counterbattery suppression, the battalion's attached radar section can establish a direct link to the battery FDC. If not, the battalion FDC must quickly process the radar request for fire and execute the fire mission as a battery fire-for-effect mission on a target of opportunity. Due to the how artillery units commonly emplace, a circular target might be more effective (Kelly 1999). The artillery fire mission in figure 37 can accomplish EFST 11.

Counterbattery and Mortar Fires

1. Battery, FFE, Mass, Circular Target, When Ready

Figure 37. Artillery Fire Mission to Support EFST 11

A consolidated list of fire missions that contribute to the accomplishment of the EFSTs for the infantry mission base is presented in table 8 and table 9.

Table 8. List of Recommended Artillery Battalion Fire Missions to Support EFSTs for the Infantry Mission Base

	Battalion Missions	Supported EFST
1	**FFE, Mass, Point Target, Converged sheaf, AMC or TOT**	**EFST 1**
2	**Adjust Fire, Mass, Point Target, Converged sheaf, WR**	**EFST 1**
3	**FFE, Mass, Linear Target, AMC or TOT**	**EFST 1**
4	**Adjust Fire, Mass, Linear Target, WR**	**EFST 1**
5	**FFE, Sweep and Zone, Large Irregular Shaped Target, Danger Close, AMC, Continuous Fire**	**EFST 2**
6	**FFE, Group of Targets, Point Targets, Danger Close, AMC, Continuous Fire**	**EFST 2**
7	**FFE, Suppression, Large Irregular Shaped Target, Danger Close, AMC, Continuous Fire**	**EFST 2**
8	**FFE, Priority Target, Linear Target, AMC, Continuous Fire**	**EFST 4**
9	**FFE, Priority Target for Mass, Linear Target, AMC, Continuous Fire**	**EFST 6**
10	**FFE, Group of Targets, Point or Linear Targets, AMC**	**EFST 8**
11	**FFE, Series, Point Targets, Schedule of Fires**	**EFST 10a**

Table 9. List of Recommended Artillery Battery Fire Missions to Support EFSTs for the Infantry Mission Base

	Battery Missions	Supported EFST
1	**Adjust Fire, Smoke, 500m Linear Target, Continuous Smoke**	**EFST 3**
2	**FFE, Priority Target, Point Target, AMC, Continuous Fire**	**EFST 4**
3	**Platoon, FFE, Priority Target for Suppression, Point Target, Danger Close, Converged Sheaf, Continuous Fire**	**EFST 5**
4	**Adjust Fire, Suppression, Point Target, Danger Close, Converged Sheaf, Continuous Fire**	**EFST 5**
5	**Platoon, FFE, Priority Target for Suppression, Point Target, Continuous Fire**	**EFST 7**
6	**Platoon, FFE, Priority Target for Illumination, By round AMC**	**EFST 7**
7	**FFE, Final Protective Fires, Linear Target, Danger Close, AMC, Continuous Fire**	**EFST 9**
8	**FFE, Suppression, Large Irregular Shaped Target, AMC**	**EFST 10b**
9	**Platoon, FFE, Illumination or Smoke (WP), Point Target, AMC**	**EFST 10b**
10	**FFE, Mass, Circular Target, WR**	**EFST 11**

Note: Since direct support battalions in light divisions are organized with 3 firing batteries, each with 6 howitzers, "Platoon" missions are actually Battery (-) missions executed with a platoon of howitzers (2) firing for effect.

Conclusion

When comparing the fire mission list in the MTP to the fire mission lists in tables 8 and 9, one can see some similarities. In fact, the MTP list looks like a generic version of the list developed by this study, with a few extra requirements included. By firing the missions provided in the MTP, therefore, direct support artillery battalions develop some of the basic building block skills required of them to support infantry combat missions. This may be adequate for artillery battalions that do not have a direct support tactical mission, where synchronization of close support fires is paramount and an established habitual relationship with a maneuver unit is the norm. Major areas not specified in the MTPs are the requirements to shoot linear targets, groups of targets, continuous fire missions, and battalion level simultaneous missions. Although *STRAC* mentions that units should conduct assault fires and a sweep and zone mission, neither event is described or provided for in the MTP. Extra fire missions that the MTP requires include coordinated illumination, immediate smoke, and high angle fires. The philosophy of battle-focused training, as outlined in FM 25-100 and FM 25-101, implies that direct support artillery units must do better.

DS FA battalions have been forced to realize this dilemma and determine for themselves the combination or arrangement of fire mission types to live-fire train that could best prepare them to support the infantry in combat. The MTP provides 28 total (11 battalion and 17 battery) fire missions for an artillery unit to incorporate into a training strategy. The fire mission lists in tables 8 and 9 outline a total of 21 artillery fire missions. The fire mission list developed by this study is not only smaller in number and

scope, but it is also more specialized and tailored to the specific type of fire missions that DS FA battalions and batteries will be called upon to perform. This is more in line with the intent of FMs 25-101 and 25-100. These missions are clearly battle focused and concentrate an artillery unit's gunnery team training on live firing the most likely and expected types of fire missions necessary to support of an infantry brigade in combat.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

This thesis discovered that only three types of combat operations (deliberate attack, defend in sector, and movement to contact) account for over 75 percent of all infantry operations performed at the NTC and the JRTC by the battalions an brigades of U.S. Army light infantry divisions. This is a clear indication of the type of operations that the Army's senior leadership expects elements of light infantry divisions to be prepared to execute. To appropriately capture the existent conditions surrounding these CTC operations, this thesis developed a list of five missions from those most commonly performed at the NTC and the JRTC. This resulted in the infantry mission base, which provided perspective on the CTC combat operations in terms of the enemy, terrain, friendly task organization, and visibility conditions. This thesis then developed twelve essential fire support tasks (table 10) necessary to contribute to the successful accomplishment of the infantry base missions.

Table 10. Consolidated List of EFSTs to Support Infantry Mission Base

EFST 1: Preparation Fires
EFST 2: Assault Fires
EFST 3: Obscuration Fires
EFST 4: Blocking Fires
EFST 5: Immediately Responsive Suppressive Fires
EFST 6: Deep Fires
EFST 7: Counterreconnaissance Fires
EFST 8: Obstacle Support and Engagement Area Fires
EFST 9: Final Protective Fires
EFST 10a: SEAD Fires for Air Assault
EFST 10b: SEAD Fires for Close Air Support
EFST 11: Counter Battery and Mortar Fires

Furthermore, within the method of each EFST, this study demonstrated how a DS FA battalion could participate in the overall successful completion of all of the EFSTs in table 10. Finally, this thesis developed a list of artillery fire missions that would best fulfill these specific requirements for field artillery fires. Although not categorized as such earlier, these artillery fire missions become the generic essential field artillery tasks (EFATs) for a DS FA battalion in a U.S. Army light division. *Fire Support Planning for the Brigade and Below*, an interim doctrinal fire support publication from the U.S. Army Field Artillery School, defines an essential field artillery task as "a task for the field artillery that must be accomplished to achieve an EFST. A fully developed EFAT has a task, purpose, method and effects. The **task** describes the effects of fires against a specific enemy formation (s) (effects of fires = suppress, neutralize, destroy, screen, or obscure)....The **purpose** is a summary of the task and purpose from the EFST. The **method** describes how the task will be accomplished by assigning responsibilities to the Field Artillery batteries, survey and BN TOC....**Effects** is a quantification of the FA task and positioning of FA units" (U.S. Army Field Artillery School 1998, 19).

In order to better communicate the conclusions generated from the research, this thesis must modify the U.S. Army Field Artillery School's definition of an EFAT. For the purposes of this thesis, the task of an EFAT comes from the term associated with the type of fires describing the EFST it supports. The purpose is unchanged, and the method comes from the artillery fire missions in tables 8 and 9 of chapter 4. As with the modified definition of an EFST, this thesis does not attempt to determine the effects

portion of each EFAT since it is peculiar to each unit and the circumstances of each potential battle.

Results from all previous research and conclusions provide a list of EFATs for a DS FA battalion in a U.S. Army light division as shown in figures 38 and 39.

Essential Field Artillery Task 1
Task: Preparation Fires.
Purpose: Destroy high payoff targets on the objective to create favorable conditions prior to committing the attack.
Method: Battalion Fire Missions No. 1,2,3,and 4.

Essential Field Artillery Task 2
Task: Assault Fires.
Purpose: Disrupt the enemy on objective from effectively engaging attacking forces with direct fires in order to allow infantry to close and engage the enemy with direct fires.
Method: Battalion Fire Missions No. 5, 6, and 7.

Essential Field Artillery Task 3
Task: Obscuration Fires
Purpose: Disrupt enemy from observing breach force and assault at the point of breach in order to allow them to reduce enemy obstacle and commence the assault.
Method: Battery Fire Mission No. 1.

Essential Field Artillery Task 4
Task: Blocking Fires.
Purpose: Delay enemy reserve to allow the attacking force to consolidate, reorganize, and establish hasty defensive positions.
Method: Battalion Fire Mission No. 8, or Battery Fire Mission No. 2.

Essential Field Artillery Task 5
Task: Immediately Responsive Suppressive Fires.
Purpose: Disrupt enemy squads from withdrawing to allow unit in contact to fire/ maneuver and destroy with direct fires.
Method: Battery Fire Missions No. 3 and 4.

Figure 38. Essential Field Artillery Tasks 1 through 5

Essential Field Artillery Task 6
Task: Deep Fires.
Purpose: Delay follow-on enemy echelons from supporting units in contact to allow defending unit to fight enemy echelons sequentially.
Method: Battalion Fire Mission No. 9.

Essential Field Artillery Task 7
Task: Counterreconnaissance Fires.
Purpose: Disrupt stationary enemy reconnaissance from identifying friendly unit defensive positions to preserve the security of defensive positions.
Method: Battery Fire Missions No. 5 and 6.

Essential Field Artillery Task 8
Task: Obstacle Support and Engagement Area Fires.
Purpose: To enhance/ augment the desired effect of the obstacle belt.
Method: Battalion Fire Mission No. 10.

Essential Field Artillery Task 9
Task: Final Protective Fires.
Purpose: Disrupt enemy infantry from penetrating friendly defensive positions to allow infantry unit to disengage.
Method: Battery Fire Mission No. 7.

Essential Field Artillery Task 10a
Task: SEAD Fires for Air Assault
Purpose: Disrupt enemy air defense weapons from effectively engaging lift aircraft from Pick-up Zone (PZ) to LZ in order to allow the initial lift to the insert and secure the LZ.
Method: Battalion Fire Mission No. 11.

Essential Field Artillery Task 10b
Task: SEAD Fires for Close Air Support.
Purpose: Disrupt enemy air defense weapons from effectively engaging CAS sorties to allow them to attack the target area unhindered by air defense fires.
Method: Battery Fire Mission No. 8 and 9.

Essential Field Artillery Task 11
Task: Counter Battery and Mortar Fires.
Purpose: Disrupt ability of enemy mortars and direct support artillery to put effective fire on critical elements at critical times and places on the battlefield.
Method: Battery Mission No. 10.

Figure 39. Essential Field Artillery Tasks 6 through 11

Recommendations

This thesis worked through a logical process to ultimately determine the EFATs for a generic DS FA battalion in any of the Army's light divisions to base an effective live-fire training strategy around. If current leaders in light division artillery battalions and batteries want to truly identify what and how they need to train to meet the missions demands of the infantry units they support, they should attempt to follow a similar process. DS FA battalions should begin to develop EFSTs and EFATs to support their brigade's METL by using the model provided by this thesis as a starting point. Once they have determined the EFATs that specifically apply to their units, leaders should incorporate them in their METL by replacing tasks such as "deliver fires" with several well-defined tasks such as "assault fire" and "counterreconnaissance fires." This will greatly assist all battalion leaders with assessing their battalion's current training status and developing effective training strategies to maintain their battalion's combat readiness.

Current artillery MTPs do not assist units in properly executing this process. The sample METLs in the MTP lack adequate specificity and the fire mission lists appear prescriptive. Both of these conditions make it very difficult for units to appropriately modify the MTP to suit their specific needs. In response, this thesis recommends that cannon artillery battalion MTPs incorporate a chapter, using the information in this thesis as an example, detailing how to properly develop EFSTs, and EFATs, to include the specific artillery fire missions to accomplish them. This allows for artillery units to practice firing a single specialized set of fire missions that are directly related to their

METLs, regardless of whether they are validating their gunnery skills or training as part of the combined arms team.

Suggestions for Future Study

There are at least four major areas that require further study to more completely address direct support artillery battalion live-fire training. First, further study is necessary to identify the forward observer and fire support tasks, conditions, and standards that compliment and drive the execution of the EFSTs identified within and the EFATs developed by this paper. Second, a similar effort is needed to identify EFSTs and EFATs to support military operations in urban terrain. Third, a research endeavor should determine for the DS FA battalions in U.S. Army heavy divisions what this thesis has done for artillery battalions and batteries in U.S. Army light divisions. A final research effort is suggested to develop and define a set of "artillery tactical tasks" that broadly describe the unique capabilities of cannon fires in the close support role. These artillery tactical tasks might very well become the doctrinal terms which units use to construct the "task" statements of their EFATs in support of a given mission. This might define field artillery roles and capabilities better than the current target effects terms of destroy, neutralize, and suppress. Some possible terms to develop and define include functions such as mass, suppress, obscure, illuminate, separate, delay, and echelon.

Final Thoughts

This thesis addressed in-depth how DS artillery battalions should support infantry combat missions and how they can develop live-fire training to better prepare to provide responsive and effective fires in combat. This study challenged the existing training

doctrine, and offered practical recommendations focused on improving artillery live-fire training and, ultimately, the synchronization of indirect fires at the brigade level and below. It is not intended to be a criticism of current artillery units and their training effectiveness. It is, rather, a recognition of existing training challenges facing artillery units today. The recommendations serve only to spark critical thought within the leadership of all field artillery units in order to help them develop the best possible training programs to prepare their units to accomplish their ultimate combat purpose: provide the "right" fires to attack the "right" target at the "right" time at the "right" place.

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